Accountability and Reporting Division | January 2008

GRADE LEVEL OF ACHIEVEMENT -2006-07 PILOT DATA

engage

Alberta EDUCATION

ALBERTA EDUCATION CATALOGUING IN PUBLICATION DATA

Alberta. Alberta Education. Accountability and Reporting Division.
Grade level of achievement 2006- 07 pilot data.

ISBN 978-0-7785-6419-5

1. Educational tests and measurements--Alberta--Handbooks, manuals, etc.
2. Students--Rating of--Alberta. 3. Academic achievement--Alberta--Testing
I. Title.

LB 3058 C2 A333 2008 371.27

For further information, contact

Accountability and Reporting Division
9th Floor, Commerce Place
10155 102 Street
Edmonton, Alberta T5J 4L5

Telephone (780) 422-8671
Toll free in Alberta by dialing 310-0000
Fax: (780) 422-8345
Email: SIG@Edc.Gov.ab.ca

This document is intended primarily for:
System and School Administrators
Education Stakeholders
Alberta Education Executive Team and Managers

And may be of interest to:
Teachers
Parents
Community Members

Copyright © 2008, the Crown in Right of Alberta, as represented by the Minister of Education.

Permission is given by the copyright owner to reproduce this document for educational purposes and on a non-profit basis.

Table of Contents

Executive Summary i
Introduction 1
Limitations of the Data 1
GLA 2007 Data Collection 1
Adjustments for GLA 2008 Data Collection 3
Description of GLA Data 3
Grade Level of Achievement – Summary of Results 7
- Students on a Graded Curriculum 7
- Severe Disabilities 9
- Mild/Moderate Disabilities 10
- Gifted 12
- English as a Second Language 13
- Gender 14
- Student Mobility 17
- Students not on a Graded Curriculum (Modified Programming) 23
- GLA and Enrolled Grade 24
- Correlations between GLA and Enrolled Grade by Sub-Groups of the Population 28
- Birth Month-Combined Grades 36
- GLA and PAT by Age within Grade Cohorts 36

GLA at a Glance 40
Comparison of GLA and PAT data 42
GLA by PAT Analysis-Comparisons Using Achievement Levels 43
Analysis of Students Below Grade Level 46
GLA for Students Missing PAT Data 48
Analysis of Grade ELA Introduced for FLA Students 50
Analysis of Students with Multiple Years of GLA Data 51
Conclusions 57
Future Analysis 58
Bibliography 60

List of Tables

Table 1 - Jurisdictions Reporting GLA 4
Table 2 - Enrolled Grade Distribution 7
Table 3- Types of Student Codes 8
Table 4 - All Students, Provincial 8
Table 5 - Students Non Coded, Provincial 8
Table 6 - Severe Disabilities, Provincial 9
Table 7 - Type of Severe Disability 9
Table 8 - Type of Severe Disability by Gender 10
Table 9 - Mild/Moderate Disabilities 10
Table 10 - Type of Mild/Moderate Disability 11
Table 11 - Type of Mild/Moderate Disability by Gender 12
Table 12 - Gifted Students, Provincial 13
Table 13 - Canadian-born ESL Students, Provincial 13
Table 14 - Foreign-born ESL Students, Provincial 14
Table 15 - Gender, Mathematics, Provincial 14
Table 16 - Gender, English Language Arts, Provincial 14
Table 17 - Gender, French Language Arts, Provincial 15
Table 18 - English Language Arts T-Tests 16
Table 19 - Math T-Tests 16
Table 20 - Student Mobility, Mathematics, Provincial 17
Table 21 - Student Mobility, English Language Arts, Provincial 18
Table 22 - Student Mobility, French Language Arts, Provincial 18
Table 23 - Student Mobility Indicator 19
Table 24 - Student Mobility Compared to GLA levels in English Language Arts 19
Table 25 - Student Mobility and English Language Arts by Enrolled Grade 20
Table 26 - Student Mobility Compared to GLA levels in Mathematics 21
Table 27 - Student Mobility and Math by Enrolled Grade 21
Table 28 - SMI by GLA, Tau-b Calculations 23
Table 29 - IPP Foundation Skills 23
Table 30 - IPP Academic Readiness Skills 24
Table 31 - IPP Life Skills 24
Table 32 - Correlations between GLA and Enrolled Grade, ELA 28
Table 33 - Correlations between GLA and Enrolled Grade, Math 29
Table 34 – Student Birth Month 36
Table 35 - GLA Overall Summary Table, Including 'GLA NA' 40
Table 36 - GLA Overall Summary Table, Excluding 'GLA NA' 41
Table 37 - PAT by GLA Tau-b Calculations 42
Table 38 - Comparison of English Language Arts PAT and GLA 43
Table 39 - Comparison of Mathematics PAT and GLA 44
Table 40 - Students below acceptable, excused or absent on the Mathematics PAT 44
Table 41 - Students below grade level or GLA NA on GLA Mathematics 45
Table 42 - Students below acceptable, excused or absent on the English Language Arts PAT 45
Table 43 - Students below grade level or GLA NA on English Language Arts GLA 45
Table 44 - Student Missing PAT Data Grade 3 48
Table 45 - Students Missing PAT Data Grade 6 49

Table 46 - Students Missing PAT Data Grade 9 49
Table 47 - Grade ELA Introduced Distribution 50
Table 48 - Grade ELA Introduced compared to French Language Arts GLA 50
Table 49 - Grade ELA Introduced compared to English Language Arts GLA 50
Table 50 – All Students, English Language Arts 52
Table 51 – All Students, Mathematics 52
Table 52 – 2006-07 Results for Students At or Above Grade Level in 2005-06, English Language Arts 53
Table 53 – 2006-07 Results for Students Below Grade Level in 2005-06, English Language Arts 53
Table 54 – 2006-07 Results for Students At or Above Grade Level in 2005-06, Mathematics ... 54
Table 55 – 2006-07 Results for Students Below Grade Level in 2005-06, Mathematics 54

Executive Summary

This report conveys the outcomes of a value-added analysis of Grade Level of Achievement (GLA) data at the provincial level. GLA data reported to Alberta Education is a teacher's judgment of a students' academic progress. GLA is based on the learner outcomes in a subject area after a course for a specific grade level has been completed and reflects the results from the full range of classroom assessments. Given the comprehensiveness of classroom-based assessment, analysis of GLA data can provide unique insights into factors that influence student achievement. GLA data provides teachers, principals, central office staff and Alberta Education with an additional tool to help inform and engage students and parents in the learning process, and to analyze and evaluate the achievement of different populations of students to ensure that their learning needs are better understood and met. When GLA is reported to parents and receiving teachers this information benefits students by supporting accurate and timely communication of achievement information as they move from one grade to the next or between schools.

Alberta Education will use GLA data for program planning. The data is not used as part of the Accountability Pillar. The key purpose of reporting GLA is identifying students who are under-achieving, asking why and providing solutions both individually and systemically.

Background

GLA pilots to demonstrate and build GLA reporting capacity were run in 2003-04 and again with a larger set of schools in 2005-06. Detailed analysis of the outcomes of these pilots supported the reliability and validity of the initial GLA data collection initiatives (Alberta Education, 2005, 2007) and provided support for continuing with the implementation of the GLA initiative.

This report describes the processes and outcomes associated with the 2006-07 Grade Level of Achievement (GLA) pilot data collection, data management and data analysis. Results of this and previous studies of GLA pilots will inform options for adjusting strategies for provincial implementation of the GLA reporting initiative. The current report demonstrates support for the four purposes for reporting GLA as defined in the GLA Handbook (Alberta Education, 2006:4), specifically:

- to provide richer information at the system level (both jurisdictional and provincial) to inform effective practices to determine the impact of specific programs on student learning (e.g., English as a Second Language, special education) and to determine processes to further refine these programs;
- as a catalyst within the school's professional learning community to focus on individual student learning needs and interests;
- to determine effective practices and strategies to foster higher levels of student achievement and confidence; and
- to contribute to the data or evidence used to report student achievement to parents/guardians, fulfilling the school's responsibility as outlined in the *Guide to Education: ECS to Grade 12* in the section entitled *Assessment as the Basis for Communicating Individual Student Achievement.*

Study Limitations

Reporting of GLA to Alberta Education in 2006-07 was expected by one-third of the Grade 1-9 schools in the province. This expectation was substantially exceeded with GLA data being submitted for the students in 60% of schools. The higher than expected number of students for whom GLA has been reported should still be treated with some caution, as there is still the potential for sampling bias which must be taken into consideration when reading this report.

The data used in this report were extracted from the data warehouse at the end of September in order to support the timely production of this report. Some GLA data has since been updated in the warehouse, that is, reports viewed on the Extranet by jurisdiction personnel may have slight variances with the results shown in this report.

Key Findings from the 2006-07 Analysis

- The degree of jurisdiction participation in the 2006-07 pilot was much higher than expected. A participation rate of 33 % was expected; however, the data submitted represents 60% of schools.
- The error rate for data submission was low with only 2.2% of the files submitted having errors.
- Compared to the 2005-06 data, the 2006-07 data demonstrates similar results for the total cohort and for specific sub-groupings of GLA data. Patterns of data distribution observed in 2005-06 with 82,000 students were also observed in the 2006-07 data.
- The data analysis demonstrates many interesting relationships. For example:
    - The large difference between Math 9 Provincial Achievement Test data and GLA data continues to be evident.
    - A much higher percentage of students coded as gifted are assessed above grade level in Math than in English Language Arts or French Language Arts.
    - When comparing foreign-born and Canadian-born students, both groups of students perform similarly in Mathematics but in English Language Arts, Canadian-born students are at an advantage.
    - Although a serendipitous finding, there is a disproportionate ratio of male: female severely coded students. There are nearly four times as many males as females coded as severely disabled.
    - When comparing GLA and PAT data, females outperform males in GLA to a statistically significant degree in both subjects in nearly all enrolled grades. The reverse is seen on the Math PAT results with males outperforming females to a statistically significant degree. In English Language Arts, females are outperforming males on the PATs.
    - A greater proportion of high mobility students (i.e. those who have changed schools more frequently than other students) have a GLA below their enrolled grade level.
- When examining mean GLA compared to enrolled grade, interesting patterns emerge:
    - Foreign-born and Canadian-born ESL students' GLA distributions are much closer together this year than was seen in the 2005-06 data.

- Foreign-born ESL students seem to have a GLA on par with their enrolled grade in Mathematics up until Grade 5. In English Language Arts the two measures diverge as early as Grade 2.

- The age effect[1] is apparent in English Language Arts in Grades 1 through 5. After Grade 5, the age effect tapers off and is no longer apparent. This relationship is more pronounced in the 2006-07 GLA data than in 2005-06, possibly due to the larger number of students in the 2006-07 data.
- There are moderate strength correlations between PATs and GLA (Grades 3, 6 and 9). This demonstrates a reasonable degree of concurrent validity of the GLA data.
- Using GLA and PAT information, GLA can provide important information for students that would not otherwise be available for students in grades not tested by PATs.

How will GLA Information be used?

- The GLA data is intended for use by Alberta Education, school jurisdictions and schools to better inform parents of their child's progress.

- Examples of Alberta Education data usage are:

  - To assist in planning improvements to provincial initiatives or programs and for curriculum evaluation.
  - To conduct further research into understanding how factors such as student gender, age, mobility and socio-economic variables influence student achievement and how interventions strategies can mitigate such negative effects. This research will be shared with jurisdiction staff to inform local strategies for improving student achievement.

- School jurisdiction and school usage include:

  - GLA data will help to ensure students and parents know and appreciate the grade level of the program of studies that the student has achieved. This information can also assist grade or school transitions so that programs are planned based on the demonstrated achievement to date.

  - Using GLA data as a benchmark, jurisdictions may wish to compare the data in school and jurisdiction GLA reports over time or in relationship to provincial norms. This can support conversations in professional learning communities regarding promising practices that have been demonstrated to improve student achievement in specific settings.

- In addition, GLA data collected by Alberta Education will be available upon request to schools as a backup if a student's record is delayed in transit or lost. This service will

[1] Age effect is defined as older students in a grade tending to have higher average test scores than the younger students in that same grade when measured by the z-score of average PAT results for each birth month group (Alberta Learning, 2001).

help teachers ensure their instruction is geared to the student's instructional level and will help the student's transition to their new school.

Next Steps in Implementation

Current plans call for submission of GLA data in Language Arts and Mathematics by all Grade 1-9 schools in the province at the end of the 2007-08 school year. Plans are on track for receiving this data with zero errors. Production of GLA reports will provide schools and jurisdictions with analysis of their GLA data in relationship to their students' age, gender, mobility and a range of socio-economic variable that will assist staff in gaining additional insight into how these variables influence their students' achievement. These reports will be available via the Extranet to the submitting schools and jurisdictions by mid-October 2008. The provincial report summarizing the 2007-08 GLA data will have a strong focus on how well various programs are serving Alberta students.

Introduction

This report describes the processes and outcomes for the 2006-07 Grade Level of Achievement (GLA) pilot data collection, data management and data analysis. The report is also intended to define the provincial context supporting the four purposes for reporting GLA as defined in the GLA Handbook (Alberta Education, 2006:4), specifically:

- to provide richer information at the system level (both jurisdictional and provincial) to inform effective practices to determine the impact of specific programs on student learning (e.g., English as a Second Language, special education) and to determine processes to further refine these programs;
- as a catalyst within the school's professional learning community to focus on individual student learning needs and interests;
- to determine effective practices and strategies to foster higher levels of student achievement and confidence; and
- to contribute to the data or evidence used to report student achievement to parents/guardians, fulfilling the school's responsibility as outlined in the *Guide to Education: ECS to Grade 12* in the section entitled *Assessment as the Basis for Communicating Individual Student Achievement.*

Limitations of the Data

When analyzing the data, the following limitations were noted:

- In 2006-07, a much bigger sample than expected was submitted that is somewhat representative of the full population of Grade 1-9 students, however, some degree of sampling bias should be assumed.

- Generalizations should be considered in relationship to the estimated confidence intervals detailed on page 7.

GLA 2007 Data Collection

Given that this was still a pilot year, a remarkably low number of data transmission errors occurred during this year's GLA data collection. Of a total of 228,150 GLA records submitted, there were 5,023 errors received (2.2%). The following table lists the number of errors by jurisdiction and the number of schools affected by these errors.

Total Errors	# of Schools Affected
1	1
456	1
6	3
34	1
949	3
3	1
1	1
37	1
4	1
2	2
3,358	120[2]
162	8
8	6
2	1

The following list shows the types of errors that occurred as well as the number and percent of each type of error.

Error Type	Number	Percent
Grade English Language Arts Introduced column incorrectly filled in for FLA students	2,377	47.3%
Duplicate record of learner (i.e. two entries for the same person)	1,417	28.2%
GLA/IPP codes not being exclusive	1,175	23.4%
Incorrect GLA or IPP code	48	1.0%
Learner's ASN (Alberta Student Number) not found	6	0.1%
Total	5,023	100.0%

The Edulink software and manual used to transmit GLA data to Alberta Education has been upgraded to identify solutions to errors that exist in the data files when they are transmitted to Alberta Education. The GLA-Edulink Manual will be revised to require errors be corrected before the deadline for GLA data submissions. This step is expected to reduce the error rate to 0%.

The individual student records having errors were not included in the 2006-07 data throughout this report nor in the school and jurisdiction reports available on the Extranet. School authorities were advised of the specific error reports so they could accommodate the error rate in their interpretation of the value added GLA reports provided back to the jurisdiction and schools that submitted GLA data. A total of 5,023 files were excluded from the data analysis due to errors.

[2] In this particular jurisdiction the bulk of the errors occurred in three schools, the remainder of schools had only one or two errors per school.

Adjustments for GLA 2008 Data Collection

Quality control measures have been built into the Edulink reporting system. In 2007-08, jurisdictions submitting files that contain errors will be sent an automated email indicating the files containing errors. Files containing errors are to be amended and re-sent via Edulink by July 7, 2008.

Description of GLA Data

A total of 923 schools from 71 authorities submitted useable Grade Level of Achievement data, reporting for 220,682 students, 3,380 of whom were not on a graded curriculum. The fields collected are as follows:

All Students:

- student name (surname and given name),
- Alberta Student Number, and
- enrolled grade, (defined as the grade to which the student was assigned) .

GLA was collected for students on a graded curriculum as defined in the Alberta programs of study, in the following fields where applicable:

- GLA in English Language Arts
- GLA in French Language Arts - (French as the Language of instruction or Immersion students)
- GLA in Mathematics
- Grade English Language Arts Introduced

Grade Level of Achievement in 2006-07 is defined as the grade level expressed as a whole number in relationship to the learning outcomes defined in the program of studies that teachers judged the student to have achieved at the end of the school year. A GLA Handbook (Alberta Education, 2006) was developed and distributed in the 2005-06 school year to facilitate pilot school participation in GLA reporting.

The GLA Handbook encourages teachers to consider GLA assessment in relationship to the full range of formative and summative assessment information available to them over the course of the school year in making a professional judgment of the student's grade level of achievement.

Students not on a graded curriculum also had data submitted. "Not on a Graded Curriculum" was meant to indicate that the student's program was restricted to learning outcomes that were significantly different from the provincial curriculum defined in the program of studies and were specifically selected to meet the student's special needs as defined in the *Standards for Special Education* (Alberta Learning, 2004). The information collected was teachers' ratings of students' learning outcomes in three areas: communication skills, functional skills and academic readiness skills. "Communication skills" refer to the development of expressive and/or receptive communication. This could be verbal communication and/or alternative modes of communication. "Functional skills" refer to skills that would assist the student in developing

independence in the home, school and community. "Academic readiness skills" refer to skills that would prepare the student for learning outcomes in the programs of study.

Alberta Education staff used the Alberta Student Number to append data fields such as Provincial Achievement Test (PAT) results (both raw scores and achievement levels), student age, gender, number of school registrations, any additional special needs codes associated with the student, and starting date. Individual student identifiers were replaced with a discrete GLA data ID, leaving no personal identifiers in the dataset used in producing this report.

All Charter School Authorities were required to report GLA in Language Arts and Math for all students in Grades 1 to 9. Jurisdictions were required to report GLA in Language Arts and Math for a minimum of one third of schools in Grades 1 to 9. Many jurisdictions reported more than one third of schools in the 2006-07 school year. Seventy-one authorities submitted valid GLA data in the 2006-07 school year. The table below outlines the number of schools submitting GLA data in each jurisdiction.

Table 1 - Jurisdictions Reporting GLA

Jurisdictions Reporting	Number of Schools (K-12)	Number of Schools Reporting	Percent of Schools Reporting
Almadina School Society	1	1	100.0%
Aspen View Regional Division No. 19	15	5	33.3%
Aurora School Ltd.	1	1	100.0%
Battle River Regional Division No. 31	34	10	29.4%
Black Gold Regional Division No. 18	26	7	26.9%
Buffalo Trail Public Schools Regional Division No. 28	28	21	75.0%
Calgary Arts Academy Society	1	1	100.0%
Calgary Girls' School Society	1	1	100.0%
Calgary Roman Catholic Separate School District No. 1	90	32	35.6%
Calgary School District No. 19	196	196	100.0%
Calgary Science School Society	1	1	100.0%
Canadian Rockies Regional Division No. 12	6	6	100.0%
CAPE - Centre for Academic and Personal Excellence Institute	1	1	100.0%
Chinook's Edge School Division No. 73	37	11	29.7%
Christ the Redeemer Catholic Separate Regional Division No. 3	13	5	38.5%
Clearview School Division No. 71	20	11	55.0%
East Central Alberta Catholic Separate Schools Regional Division No. 16	8	2	25.0%
East Central Francophone Education Region No. 3	4	1	25.0%
Edmonton Catholic Separate School District No. 7	80	31	38.8%
Edmonton School District No. 7	197	197	100.0%
Elk Island Catholic Separate Regional Division No. 41	16	5	31.3%
Elk Island Public Schools Regional Division No. 14	40	39	97.5%
Evergreen Catholic Separate Regional Division No. 2	8	2	25.0%
Foothills School Division No. 38	23	7	30.4%

Jurisdictions Reporting	Number of Schools (K-12)	Number of Schools Reporting	Percent of Schools Reporting
Fort McMurray Public School District No. 2833	12	11	91.7%
Fort McMurray Roman Catholic Separate School District No. 32	9	3	33.3%
Fort Vermilion School Division No. 52	18	5	27.8%
Foundations for the Future Charter Academy Charter School Society	6	6	100.0%
Golden Hills School Division No. 75	40	20	50.0%
Grande Prairie Roman Catholic Separate School District No. 28	11	3	27.3%
Grande Prairie School District No. 2357	12	6	50.0%
Grande Yellowhead Regional Division No. 35	22	21	95.5%
Grasslands Regional Division No. 6	19	1	5.3%
Greater North Central Francophone Education Region No. 2	11	0	0.0%
Greater Southern Public Francophone Education Region No. 4	7	2	28.6%
Greater Southern Separate Catholic Francophone Education Region No. 4	3	3	100.0%
Greater St. Albert Catholic Regional Division No. 29	17	6	35.3%
High Prairie School Division No. 48	11	11	100.0%
Holy Family Catholic Regional Division No. 37	9	7	77.8%
Holy Spirit Roman Catholic Separate Regional Division No. 4	13	11	84.6%
Horizon School Division No. 67	33	6	18.2%
Lakeland Roman Catholic Separate School District No. 150	7	7	100.0%
Lethbridge School District No. 51	20	6	30.0%
Living Waters Catholic Regional Division No. 42	5	5	100.0%
Livingstone Range School Division No. 68	28	2	7.1%
Medicine Hat Catholic Separate Regional Division No. 20	10	3	30.0%
Medicine Hat School District No. 76	16	6	37.5%
Mother Earth's Children's Charter School Society	1	1	100.0%
New Horizons Charter School Society	1	1	100.0%
Northern Gateway Regional Division No. 10	20	7	35.0%
Northern Lights School Division No. 69	25	24	96.0%
Northland School Division No. 61	22	6	27.3%
Northwest Francophone Education Region No. 1	3	1	33.3%
Palliser Regional Division No. 26	32	20	62.5%
Peace River School Division No. 10	18	6	33.3%
Peace Wapiti School Division No. 76	29	7	24.1%
Pembina Hills Regional Division No. 7	20	5	25.0%
Prairie Land Regional Division No. 25	18	3	16.7%
Prairie Rose School Division No. 8	34	33	97.1%
Red Deer Catholic Regional Division No. 39	15	4	26.7%
Red Deer School District No. 104	29	8	27.6%
Rocky View School Division No. 41	37	16	43.2%

Jurisdictions Reporting	Number of Schools (K-12)	Number of Schools Reporting	Percent of Schools Reporting
St. Albert Protestant Separate School District No. 6	12	2	16.7%
St. Paul Education Regional Division No. 1	16	9	56.3%
St. Thomas Aquinas Roman Catholic Separate Regional Division No. 38	7	2	28.6%
Sturgeon School Division No. 24	12	4	33.3%
Suzuki Charter School Society	1	1	100.0%
Westmount Charter School Society	1	1	100.0%
Westwind School Division No. 74	29	4	13.8%
Wetaskiwin Regional Division No. 11	20	3	15.0%
Wild Rose School Division No. 66	16	5	31.3%
Wolf Creek School Division No. 72	30	5	16.7%
Total	1,492	923	61.9%[3]

[3] Provincially, 60% of all schools submitted GLA data. This table has excluded Parkland School Division that was exempted for 2006-07, Moberly Hall Charter school which closed, and Boyle Street Charter school that had no grade 1-9 enrolment from the school counts resulting in a higher percentage of schools submitting GLA data.

Grade Level of Achievement – Summary of Results

Students on a Graded Curriculum

There were 217,302 students on a graded curriculum included in this sample for the 2006-07 school year. The students are roughly evenly distributed by enrolled grade with approximately 11% of the students in each grade cohort. The table below shows the distribution of the GLA sample data by enrolled grade (Grades 1 to 9) compared to the Provincial[4] distribution.

Table 2 - Enrolled Grade Distribution

Enrolled Grade Distribution					
Enrolled Grade	Frequency	Percent of Total	Province	Percent of Total	95% Confidence Interval[5]
1	23,692	10.9%	42,176	10.6%	+/- 0.47%
2	23,929	11.0%	42,493	10.7%	+/- 0.47%
3	23,896	11.0%	42,656	10.7%	+/- 0.47%
4	23,954	11.0%	42,597	10.7%	+/- 0.47%
5	23,839	11.0%	43,858	11.0%	+/- 0.47%
6	24,582	11.3%	45,050	11.3%	+/- 0.46%
7	24,240	11.2%	45,544	11.5%	+/- 0.47%
8	24,267	11.2%	45,790	11.5%	+/- 0.46%
9	24,903	11.5%	47,014	11.8%	+/- 0.45%
Total	217,302	100.0%	397,178	100.0%	+/- 0.15%

Students could have been coded as severely disabled, mild/moderately disabled, gifted or ESL. Those students who were not coded as any of those categories are termed 'non-coded'. The non-coded students make up the largest proportion of the sample as shown in the chart below.

[4] In Tables 2 and 3, the "Province" columns refer to the data for the entire province. In the remainder of the report, provincial comparisons refer to the provincial sample of GLA data.

[5] The estimated confidence interval is expressed as a percentage and indicates how confident the researcher wants to be (e.g. 95% confident) that the data collected accurately represents the results of the entire population. The objective is to obtain a sample large enough to ensure a 95% confidence that the results will be within +/- 3% around the mean. In this report sample sizes are very large and provide a high degree of confidence that sampling error is minimal.

Table 3- Types of Student Codes

Type of Student Codes					
	GLA Totals	Percent of GLA Total	Provincial Totals	Percent of Provincial Total	95% Confidence Interval
Non-Coded	170,637	77.9%	313,612	79.0%	+/- 0.17
Severe Disabilities	5,303	2.4%	12,576	3.2%	+/- 0.86
Mild/Moderate Disabilities	16,769	7.7%	30,835	7.8%	+/- 0.56
Gifted	3,314	1.5%	5,221	1.3%	+/- 1.31
ESL –Canadian-born	11,795	5.4%	18,690	4.7%	+/- 0.69
ESL – Foreign-born	11,139	5.1%	16,244	4.1%	+/- 0.71
Total	218,957*	100.0%	397,178	100.0%	+/- 0.13

*This is higher than the total in Table 2 because some students have double codes.

The distribution of students in each of the GLA results categories by subject is shown in the table below.

Table 4 - All Students, Provincial

All Students – Province

	Mathematics		English Language Arts		French Language Arts	
	Number of students	Percent of total enrolled (%)	Number of students	Percent of total enrolled (%)	Number of students	Percent of total enrolled (%)
GLA below enrolled grade	21,348	9.8%	24,116	11.1%	741	5.8%
GLA equal to enrolled grade	190,426	87.6%	185,148	85.2%	10,758	84.8%
GLA above enrolled grade	1,027	0.5%	540	0.2%	45	0.4%
GLA NA[6]	4,501	2.1%	7,498	3.5%	1,142	9.0%
Total	**217,302**	**100.0%**	**217,302**	**100.0%**	**12,686**	**100.0%**

Table 5 - Students Non Coded, Provincial

Students non coded (as mild/moderate, severe, gifted, or ESL) – Province

	Mathematics		English Language Arts		French Language Arts	
	Number of students	Percent of total enrolled (%)	Number of students	Percent of total enrolled (%)	Number of students	Percent of total enrolled (%)
GLA below enrolled grade	10,443	6.1%	11,248	6.6%	587	5.1%
GLA equal to enrolled grade	156,991	92.0%	154,046	90.3%	9,947	86.5%
GLA above enrolled grade	619	0.4%	452	0.3%	36	0.3%
GLA NA	2,584	1.5%	4,891	2.9%	936	8.1%
Total	**170,637**	**100.0%**	**170,637**	**100.0%**	**11,506**	**100.0%**

[6] GLA NA refers to missing data, a "not applicable" situation, or "not available."

Severe Disabilities

There were 5,303 students coded as severely disabled who had GLA reported for English Language Arts and Mathematics. There were 69 students coded as severely disabled who had GLA reported for French Language Arts. The chart below presents students having a severe disability code and their grade level of achievement.

Table 6 - Severe Disabilities, Provincial

Students coded as having Severe Disabilities – Provincial

	Mathematics		English Language Arts		French Language Arts	
	Number of students	Percent of total enrolled (%)	Number of students	Percent of total enrolled (%)	Number of students	Percent of total enrolled (%)
GLA below enrolled grade	2,022	38.1%	2,101	39.6%	14	20.3%
GLA equal to enrolled grade	2,924	55.1%	2,838	53.5%	45	65.2%
GLA above enrolled grade	11	0.2%	9	0.2%	0	0.0%
GLA NA	346	6.5%	355	6.7%	10	14.5%
Total	**5,303**	**100.0%**	**5,303**	**100.0%**	**69**	**100.0%**

More than half of students with a severe disability enrolled in Mathematics have a GLA equal to their enrolled grade (55.1%). In Language Arts 53.5% of students have a GLA equal to their enrolled grade. Mathematics and Language Arts are fairly similar in their GLA distribution. A very low proportion of French Immersion or French as the language of instruction students were coded as severely disabled.

The chart below provides information on all students who were on a graded curriculum and were coded as severely disabled, by their disability type. The majority of students coded with a severe disability are those with an emotional/behavioural or physical/medical disability. Among the different types of severe disabilities, the distribution of students among GLA categories varies more widely than the overall severe disability distribution (see above table). Knowing the type of severe disability may aid in understanding the student distribution throughout GLA categories.

Table 7 - Type of Severe Disability

Type of Severe Disability			Mathematics			English Language Arts		
	Frequency	Percentage of Total	% at or above grade level	% below grade level	% GLA NA	% at or above grade level	% below grade level	% GLA NA
Severe Cognitive Disability	12	0.2%	33.3%	41.7%	25.0%	41.7%	33.3%	25.0%
Severe Emotional /Behavioural Disability	2,925	55.2%	58.9%	35.9%	5.2%	56.8%	37.9%	5.3%
Severe Multiple Disability	204	3.8%	28.9%	56.4%	14.7%	27.0%	56.9%	16.2%
Severe Physical or Medical Disability	1,976	37.3%	52.8%	39.6%	7.6%	52.4%	39.9%	7.7%
Deafness	117	2.2%	46.2%	46.2%	7.7%	35.9%	54.7%	9.4%
Blindness	68	1.3%	77.9%	20.6%	1.5%	72.1%	25.0%	2.9%
Total	**5,302**	**100.0%**	**55.4%**	**38.1%**	**6.5%**	**53.7%**	**39.6%**	**6.7%**

Note: 1 ECS student was not shown on this table. The student is included in the remainder of the report as they are enrolled in a grade.

Table 8 - Type of Severe Disability by Gender

Type of Severe Disability by Gender				Mathematics			English Language Arts		
	Gender	Frequency	Percentage of each disability code	% at or above grade level	% below grade level	% GLA NA	% at or above grade level	% below grade level	% GLA NA
Severe Cognitive Disability	Male	6	50.0%	33.3%	50.0%	16.7%	33.3%	50.0%	16.7%
	Female	6	50.0%	33.3%	33.3%	33.3%	50.0%	16.7%	33.3%
Severe Emotional /Behavioural Disability	Male	2,402	82.1%	60.0%*	35.1%*	4.9%	56.7%*	37.9%*	5.1%
	Female	523	17.9%	53.9%	39.6%	6.5%	55.6%	38.0%	5.9%
Severe Multiple Disability	Male	129	63.2%	33.3%	51.9%	14.7%	27.1%	55.8%	17.1%
	Female	75	36.8%	21.3%	64.0%*	14.7%	26.7%*	58.7%*	14.7%
Severe Physical or Medical Disability	Male	1,463	74.0%	55.9%	36.4%	7.7%	54.1%	38.2%	7.7%
	Female	513	26.0%	43.9%*	48.5%*	7.6%	47.4%*	44.8%*	7.8%
Deafness	Male	61	52.1%	45.9%	47.5%	6.6%	34.4%	59.0%	6.6%
	Female	56	47.9%	46.4%*	44.6%*	8.9%*	37.5%*	50.0%*	12.5%*
Blindness	Male	45	66.2%	82.2%	15.6%	2.2%	77.8%	17.8%	4.4%
	Female	23	33.8%	69.6%*	30.4%*	0.0%	60.9%	39.1%*	0.0%
Totals	**Male**	**4,106**	**77.4%**	**57.7%**	**36.1%**	**6.2%**	**54.7%**	**38.7%**	**6.4%**
	Female	**1,196**	**22.6%**	**47.4%**	**45.0%**	**7.6%**	**49.5%**	**42.7%**	**7.6%**

Note: 1 ECS student was not shown on this table. The student is included in the remainder of the report as they are enrolled in a grade.
* Asterisk indicates a statistically significant difference between genders for the GLA categories indicated. Differences are significant at the 0.05 level.

When the students coded as having a severe disability are shown by gender, the large difference between genders becomes apparent. A large proportion (77.4%) of these students were males, most of whom were students with an emotional/behavioural disability.

Mild/Moderate Disabilities

There were 16,769 students in the 2006-07 sample having mild or moderate disability codes in English Language Arts and Mathematics. In French Language Arts, 369 students were coded as having a mild or moderate disability. The chart below shows the mild or moderate students' distribution across GLA categories.

Table 9 - Mild/Moderate Disabilities

Students coded as having Mild/Moderate Disabilities – Provincial						
	Mathematics		English Language Arts		French Language Arts	
	Number of students	Percent of total enrolled (%)	Number of students	Percent of total enrolled (%)	Number of students	Percent of total enrolled (%)
GLA below enrolled grade	6,693	39.9%	7,430	44.3%	93	25.2%
GLA equal to enrolled grade	9,415	56.1%	8,692	51.8%	222	60.2%
GLA above enrolled grade	25	0.1%	17	0.1%	2	0.5%
GLA NA	636	3.8%	630	3.8%	52	14.1%
Total	**16,769**	**100.0%**	**16,769**	**100.0%**	**369**	**100.0%**

In both Mathematics and Language Arts, a slim majority of students have a GLA equal to their enrolled grade.

The chart below shows the breakdown of students on a graded curriculum having a mild or moderate disability by the type of disability. The largest proportion of students coded with a mild/moderate disability has a mild cognitive disability or a learning disability. Students having a mild or moderate cognitive disability compose the largest proportion of students attaining below their grade level. As in the severe disability chart, students who were 'at or above grade level' were combined into a single category due to the small number of students who were achieving 'above grade level'.

Table 10 - Type of Mild/Moderate Disability

Type of Mild/Moderate Disability			Mathematics			English Language Arts		
	Frequency	Percentage of Total	% at or above grade level	% below grade level	% GLA NA	% at or above grade level	% below grade level	% GLA NA
Mild Cognitive Disability	2,922	17.4%	21.6%	68.7%	9.7%	21.0%	69.7%	9.2%
Moderate Cognitive Disability	93	0.6%	11.8%	64.5%	23.7%	9.7%	67.7%	22.6%
Emotional/Behavioural Disability	1,766	10.5%	69.6%	27.9%	2.4%	72.1%	25.8%	2.2%
Learning Disability	7,726	46.1%	60.3%	37.4%	2.3%	55.1%	43.0%	1.9%
Hearing Disability	173	1.0%	76.3%	20.2%	3.5%	76.3%	20.8%	2.9%
Visual Disability	25	0.1%	96.0%	4.0%	0.0%	92.0%	8.0%	0.0%
Communication Disability	2,330	13.9%	72.2%	25.3%	2.5%	59.8%	36.1%	4.1%
Physical/Medical Disability	870	5.2%	70.2%	26.8%	3.0%	67.7%	28.6%	3.7%
Multiple Disability	862	5.1%	53.4%	44.4%	2.2%	48.6%	48.8%	2.6%
Total	**16,767**	**100.0%**	**56.3%**	**39.9%**	**3.8%**	**51.9%**	**44.3%**	**3.8%**

Note: 2 students coded as ECS Developmentally Immature were removed from this analysis. They have been included in the rest of the report.

The following chart shows each mild/moderate disability type by gender.

Table 11 - Type of Mild/Moderate Disability by Gender

Type of Mild/Moderate Disability by Gender				Mathematics			English Language Arts		
	Gender	Frequency	Percentage of each disability	% at or above grade level	% below grade level	% GLA NA	% at or above grade level	% below grade level	% GLA NA
Mild Cognitive Disability	Male	1,728	59.1%	22.3%	68.1%	9.6%	20.3%	70.3%	9.4%
	Female	1,194	40.9%	20.7%*	69.4%	9.9%*	22.2%*	68.9%*	8.9%
Moderate Cognitive Disability	Male	48	51.6%	12.5%	60.4%	27.1%	8.3%	68.8%	22.9%
	Female	45	48.4%	11.1%	68.9%	20.0%	11.1%	66.7%	22.2%
Emotional/Behavioural Disability	Male	1,295	73.3%	70.1%*	27.6%*	2.3%	71.9%*	25.8%*	2.3%
	Female	471	26.7%	68.4%	28.9%	2.8%	72.6%	25.7%	1.7%
Learning Disability	Male	4,820	62.4%	62.4%	35.2%	2.4%	54.3%	43.7%	2.0%
	Female	2,906	37.6%	56.7%*	41.1%	2.2%	56.3%*	41.9%	1.8%
Hearing Disability	Male	90	52.0%	81.1%	15.6%	3.3%	80.0%	17.8%	2.2%
	Female	83	48.0%	71.1%*	25.3%*	3.6%	72.3%*	24.1%*	3.6%
Communication Disability	Male	1,501	64.4%	74.5%	22.9%	2.7%	58.8%	37.1%	4.1%
	Female	829	35.6%	68.0%	29.7%	2.3%	61.6%	34.4%	4.0%
Physical/Medical Disability	Male	660	71.0%	75.5%*	21.2%	3.3%	68.8%*	27.2%	4.0%
	Female	270	29.0%	58.5%	39.3%	2.2%	65.2%	31.9%	3.0%
Multiple Disability	Male	609	70.6%	55.8%*	41.9%*	2.3%	48.6%*	48.8%*	2.6%
	Female	253	29.4%	47.4%	50.6%	2.0%	48.6%	49.0%	2.4%
Visual Disability	Male	18	72.0%	94.4%	5.6%	0.0%	88.9%	11.1%	0.0%
	Female	7	28.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%
Totals	**Male**	**10,709**	63.9%	58.9%	37.4%	3.7%	52.1%	44.1%	3.7%
	Female	**6,058**	36.1%	51.7%	44.4%	3.9%	51.6%	44.7%	3.7%

Note: 2 students coded as ECS Developmentally Immature were removed from this analysis. They have been included in the rest of the report.
* Asterisk indicates a statistically significant difference between genders. Differences are significant at the 0.05 level.

Table 11 illustrates the gender differences in GLA categories across the mild/moderate disability types. The gender difference is most noticeable for students having a physical or medical disability.

Gifted

In this sample of students, 3,314 were coded as being gifted in English Language Arts or Mathematics. There were 156 students in French Language Arts coded as gifted. The chart below shows the grade level of achievement distributions for students coded as gifted.

Table 12 - Gifted Students, Provincial

Students coded as gifted – Provincial

	Mathematics		English Language Arts		French Language Arts	
	Number of students	Percent of total enrolled (%)	Number of students	Percent of total enrolled (%)	Number of students	Percent of total enrolled (%)
GLA below enrolled grade	74	2.2%	79	2.4%	3	1.9%
GLA equal to enrolled grade	2,962	89.4%	3,198	96.5%	126	80.8%
GLA above enrolled grade	248	7.5%	12	0.4%	1	0.6%
GLA NA	30	0.9%	25	0.8%	26	16.7%
Total	**3,314**	**100.0%**	**3,314**	**100.0%**	**156**	**100.0%**

The general assumption with gifted students is that they tend to achieve and perform better than the population of students as a whole. According to the above frequency table, we can see that the majority of gifted students are performing equal to their enrolled grade level, and slightly more that 2% of students are 'below grade level' for each subject. Gifted students are performing better in Mathematics than in English Language Arts with approximately 7% more students having a GLA 'above grade level' in Math.

English as a Second Language

For English as a Second Language (ESL) students, there were two groups of student codes. The first are ESL students coded as Canadian-born (303). Of this group of students there were 11,795 in English Language Arts and Mathematics and 353 students in French Language Arts. For ESL students who are coded as foreign-born (301), there were 11,139 in English Language Arts and Mathematics and 242 in French Language Arts. The distribution of both groups' GLAs is shown in the charts below.

Table 13 - Canadian-born ESL Students, Provincial

Students coded as English as a Second Language – Canadians-born (303) - Provincial

	Mathematics		English Language Arts		French Language Arts	
	Number of students	Percent of total enrolled (%)	Number of students	Percent of total enrolled (%)	Number of students	Percent of total enrolled (%)
GLA below enrolled grade	1,480	12.5%	1,898	16.1%	28	7.9%
GLA equal to enrolled grade	9,801	83.1%	9,121	77.3%	251	71.1%
GLA above enrolled grade	69	0.6%	40	0.3%	4	1.1%
GLA NA	445	3.8%	736	6.2%	70	19.8%
Total	**11,795**	**100.0%**	**11,795**	**100.0%**	**353**	**100.0%**

Table 14 - Foreign-born ESL Students, Provincial

Students coded as English as a Second Language - Foreign-born (301) - Provincial						
	Mathematics		English Language Arts		French Language Arts	
	Number of students	Percent of total enrolled (%)	Number of students	Percent of total enrolled (%)	Number of students	Percent of total enrolled (%)
GLA below enrolled grade	1,260	11.3%	2,061	18.5%	17	7.0%
GLA equal to enrolled grade	9,226	82.8%	8,046	72.2%	175	72.3%
GLA above enrolled grade	68	0.6%	14	0.1%	2	0.8%
GLA NA	585	5.3%	1,018	9.1%	48	19.8%
Total	**11,139**	**100.0%**	**11,139**	**100.0%**	**242**	**100.0%**

The above tables show that both Canadian-born and Foreign-born ESL students follow a similar pattern to one another. Approximately 83-84% of each ESL group is attaining a GLA that is equal to or above enrolled grade in Math and about 72-78% are equal to or above grade level in ELA.

Gender

Students' GLA was broken down by gender in order to observe any patterns that may emerge. In this sample of students there was a larger number of males than females. The charts below show students' GLA by gender in each of the three subjects.

Table 15 - Gender, Mathematics, Provincial

Gender - Provincial	Mathematics			
	Female		Male	
	Number of students	Percent of total enrolled (%)	Number of students	Percent of total enrolled (%)
GLA below enrolled grade	9,504	9.0%	11,844	10.6%
GLA equal to enrolled grade	93,918	88.7%	96,508	86.7%
GLA above enrolled grade	464	0.4%	563	0.5%
GLA NA	2,044	1.9%	2,457	2.2%
Total	**105,930**	**100.0%**	**111,372**	**100.0%**

Note: All of the above observed relationships were significant when measured by Chi square.

Table 16 - Gender, English Language Arts, Provincial

Gender - Provincial	English Language Arts			
	Female		Male	
	Number of students	Percent of total enrolled (%)	Number of students	Percent of total enrolled (%)
GLA below enrolled grade	9,335	8.8%	14,781	13.3%
GLA equal to enrolled grade	92,749	87.6%	92,399	83.0%
GLA above enrolled grade	308	0.3%	232	0.2%
GLA NA	3,538	3.3%	3,960	3.6%
Total	105,930	100.0%	111,372	100.0%

Note: All of the above observed relationships were significant when measured by Chi square.

Table 17 - Gender, French Language Arts, Provincial

Gender - Provincial	French Language Arts			
	Female		Male	
	Number of students	Percent of total enrolled (%)	Number of students	Percent of total enrolled (%)
GLA below enrolled grade	360	5.1%	381	6.7%
GLA equal to enrolled grade	5980	85.2%	4778	84.4%
GLA above enrolled grade	31	0.4%	14	0.3%
GLA NA	651	9.3%	491	8.7%
Total	**7022**	**100.0%**	**5664**	**100.0%**

Note: All of the above observed relationships were significant when measured by Chi square.

The three tables above show the frequency of female and male students in each of the GLA categories in Mathematics, English Language Arts, and French Language Arts. When testing for independence between genders, Chi-squared[7] was used. There is a statistically significant difference between the genders in both Math and English Language Arts.

Pope, Wentzel and Cammaert (2003) conducted a study which showed that larger gender differences were found in school-awarded marks than in the diploma exam marks in favour of females in almost all diploma courses. Math courses (both Math 30 Pure and Applied) were among those subjects where boys, while being outperformed by girls in school-awarded marks, did better than girls in diploma exam marks. Therefore, the question of gender differences between GLA and PAT results were of interest in the current report.

The following tables illustrate the differences in GLA and PATs across the enrolled grades for each gender. It is quite interesting to note that, similar to the 2003 study, on GLAs, females outperform males to a statistically significant degree in both subjects in nearly all enrolled grades. The reverse is seen on the Math PAT results with males outperforming females to a statistically significant degree. However, in English Language Arts, females are outperforming males on the PATs. These findings point to a potential area for future research to investigate gender differentials and the causal factors associated with these differences.

[7] Chi square is defined as "A nonparametric procedure for testing whether the observed frequencies of scores in different categories of a variable differ from the theoretically predicted frequencies" (Harris, 1995).

Table 18 - English Language Arts T-Tests

English Language Arts GLA T-Tests

Enrolled Grade	*Gender*	*05-06 N*	*05-06 Mean GLA*	*06-07 N*	*06-07 Mean GLA*
1	F	3,562	1.01	11,525	0.93*
	M	3,518	1.01	12,167	0.88*
2	F	4,161	1.93*	11,704	1.90*
	M	4,356	1.89*	12,225	1.85*
3	F	4,236	2.89*	11,641	2.88*
	M	4,511	2.84*	12,255	2.83*
4	F	4,281	3.86*	11,608	3.87*
	M	4,633	3.79*	12,346	3.79*
5	F	4,535	4.81*	11,440	4.84*
	M	4,664	4.75*	12,399	4.76*
6	F	4,280	5.80*	12,114	5.82*
	M	4,689	5.71*	12,468	5.74*
7	F	4,127	6.87*	11,790	6.88*
	M	4,350	6.75*	12,450	6.78*
8	F	4,444	7.88*	11,849	7.88*
	M	4,489	7.77*	12,418	7.77*
9	F	4,466	8.87*	12,259	8.87*
	M	4,571	8.77*	12,644	8.76*

English Language Arts PAT T-Tests

Enrolled Grade	*Gender*	*05-06 N*	*05-06 Mean PAT Score*	*06-07 N*	*06-07 Mean PAT Score*
3	F	4,088	71.03*	10,790	69.72*
	M	4,244	68.50*	11,537	66.72*
6	F	4,039	68.36*	11,451	69.79*
	M	4,304	64.90*	11,923	65.40*
9	F	4,154	71.42*	11,337	68.36*
	M	4,139	66.77*	11,742	63.25*

* indicates a statistically significant difference between males and females.

Table 19 - Math T-Tests

Mathematics GLA T-Tests

Enrolled Grade	*Gender*	*05-06 N*	*05-06 Mean GLA*	*06-07 N*	*06-07 Mean GLA*
1	F	4,024	1.01	11,525	0.95*
	M	4,080	1.01	12,167	0.93*
2	F	4,293	1.95	11,704	1.93
	M	4,495	1.96	12,225	1.92
3	F	4,250	2.92	11,641	2.90
	M	4,530	2.91	12,255	2.89
4	F	4,274	3.88	11,608	3.89*
	M	4,640	3.87	12,346	3.86*
5	F	4,521	4.84	11,440	4.85*
	M	4,660	4.83	12,399	4.82*
6	F	4,266	5.83	12,114	5.82*
	M	4,670	5.80	12,468	5.80*
7	F	3,941	6.88*	11,790	6.87*
	M	4,212	6.83*	12,450	6.82*
8	F	4,197	7.89*	11,849	7.86*
	M	4,254	7.80*	12,418	7.81*
9	F	4,217	8.85*	12,259	8.82*
	M	4,346	8.78*	12,644	8.76*

Mathematics PAT T-Tests

Enrolled Grade	*Gender*	*05-06 N*	*05-06 Mean PAT Score*	*06-07 N*	*06-07 Mean PAT Score*
3	F	4,083	33.12*	10,790	30.60*
	M	4,240	34.07*	11,537	31.54*
6	F	4,054	36.64*	11,451	34.47*
	M	4,335	37.60*	11,923	36.03*
9	F	4,166	32.44	11,337	30.80*
	M	4,162	32.35	11,742	31.36*

* indicates a statistically significant difference between males and females.

Student Mobility

When a student changes schools, he/she must learn to deal with a new physical, social and learning environment - new teachers, new classmates, possibly different sets of rules, different learning expectations - and may start at a different point in the curriculum than he/she left behind. It also takes some time for teachers to determine the student's learning level, learning style, interaction skills, etc., and thus define the optimal program for his/her ongoing learning.

These issues contribute to the findings, within the research literature, of a negative relationship between the number of times a student changes schools in a given period and his/her academic growth in that period. Other studies (Wasserman, 2001) of this relationship in an Alberta setting have supported these findings and suggest that additional research would be useful, to not only enrich the understanding of the relationship but to highlight any situations in which the negative impacts may have been mitigated by helpful strategies to support better transitions for students and schools. The GLA data provides such an opportunity for additional research. It permits an on-going analysis of the relationship between the number of school changes students have made and their current grade level of achievement, thus allowing for an assessment of the cumulative impact of mobility.

Student mobility is captured by Alberta Education, once at the end of September and again in March, and compiled in the Student Information System (SIS). The Student Mobility Indicator (SMI) provides an indication of the number of times a student has changed schools since entry into the Alberta school system. The SMI is calculated by counting the number of different school registrations each student has up until the most recent calendar year. Students could be changing schools more frequently than is captured, thus the numbers shown are a conservative estimate of student mobility. All students start with an SMI of 1 as they have all been registered in at least one school. Student mobility is then broken down into two categories – high and low. In Grades 1-3, high mobility students are those having a mobility indicator of 2 or more. Students having a mobility indicator of 1 are considered low mobility. In Grades 4-6, high mobility students are those having a mobility indicator of 3 or more. Students having a mobility indicator of 2 or less are considered low mobility. In Grades 7-9, high mobility students are those having a mobility indicator of 4 or more. Low mobility students have a mobility indicator of 3 or less. In the following tables the two categories of mobility includes students on a graded curriculum in Grades 1 to 9.

Table 20 - Student Mobility, Mathematics, Provincial

Mobility - Provincial	Mathematics			
	High		Low	
	Number of students	Percent of total enrolled (%)	Number of students	Percent of total enrolled (%)
GLA below enrolled grade	8,970	15.4%	12,376	7.%
GLA equal to enrolled grade	47,253	81.16%	143,169	90.0%
GLA above enrolled grade	317	0.5%	710	0.5%
GLA NA	1,680	2.9%	2,819	1.8%
Total	**58,220**	**100.0%**	**159,074**	**100.0%**

Table 21 - Student Mobility, English Language Arts, Provincial

Mobility - Provincial	English Language Arts			
	High		Low	
	Number of students	Percent of total enrolled (%)	Number of students	Percent of total enrolled (%)
GLA below enrolled grade	9,515	16.3%	14,599	9.2%
GLA equal to enrolled grade	46,582	80.0%	138,563	87.11%
GLA above enrolled grade	122	0.2%	418	0.3%
GLA NA	2,001	3.4%	5,494	3.5%
Total	**58,220**	**100.0%**	**159,074**	**100.0%**

Table 22 - Student Mobility, French Language Arts, Provincial

Mobility - Provincial	French Language Arts			
	High		Low	
	Number of students	Percent of total enrolled (%)	Number of students	Percent of total enrolled (%)
GLA below enrolled grade	113	6.5%	628	5.7%
GLA equal to enrolled grade	1,351	77.7%	9,407	85.9%
GLA above enrolled grade	6	0.3%	39	0.4%
GLA NA	268	15.4%	874	8.0%
Total	**1,738**	**100.0%**	**10,948**	**100.0%**

The majority of students can be described as having low mobility (69.1% of all students with GLA data). One of the most salient observations from the above tables is that a greater proportion of high mobility students have a GLA below their enrolled grade level compared to low mobility students. This observation supports the hypothesis that mobility negatively affects student achievement.

As noted above, student mobility was calculated based on the number of different school registrations a student had accumulated. Each student begins with an SMI of 1, indicating that they have been registered in one school. When a student registers in a different school, the SMI will increase by 1. The chart below lists the student mobility indicator values and the number of students having each SMI.

Table 23 - Student Mobility Indicator

Student Mobility Indicator (SMI)			
Indicator	**Frequency**	**Percent**	**Cumulative Percent**
1	95,890	44.1%	44.1%
2	60,141	27.7%	71.8%
3	29,879	13.8%	85.5%
4	14,714	6.8%	92.3%
5	7,651	3.5%	95.8%
6	4,080	1.9%	97.7%
7	2,176	1.0%	98.7%
8	1,200	0.6%	99.3%
9	735	0.3%	99.6%
10	363	0.2%	99.8%
11	213	0.1%	99.9%
12	123	0.1%	99.88%
13	64	0.06%	99.94%
14	28	0.03%	99.97%
15-21	30	0.03%	100.0%
Total	**217,287***	**100.0%**	100.0%

* 15 students are missing a student mobility indicator

The chart above shows approximately 86% of students in our sample had 3 or fewer different school registrations. Bear in mind students in the table above are in Grades 1 through 9 and those students in the younger grades are the reason for the large number of students with a mobility indicator of 3 or less. The following chart displays SMI by GLA above or equal to enrolled grade as well as by GLA below enrolled grade for English Language Arts.

Table 24 - Student Mobility Compared to GLA levels in English Language Arts

Students' GLA levels compared to Mobility Indicators in English Language Arts				
Mobility Indicator	**GLA Equal or Above**	**GLA Below**	**GLA NA**	**Count**
1	81,988 (85.5%)	9,255 (9.7%)	4,647 (4.8%)	95,890
2	53,287 (88.6%)	5,768 (9.6%)	1,086 (1.8%)	60,141
3	25,749 (86.2%)	3,505 (11.7%)	625 (2.1%)	29,879
4	12,134 (82.5%)	2,202 (15.0%)	378 (2.6%)	14,714
5	6,083 (79.5%)	1,346 (17.6%)	222 (2.9%)	7,651
6	3,091 (75.8%)	827 (20.3%)	162 (4.0%)	4,080
7	1,561 (71.7%)	479 (22.0%)	136 (6.3%)	2,176
8	812 (67.7%)	310 (25.8%)	78 (6.5%)	1,200
9	471 (64.1%)	199 (27.1%)	65 (8.8%)	735
10-21	505 (61.5%)	222(27.0%)	94(11.4%)	821
Total	**185,681 (85.5%)**	**24,113 (11.1%)**	**7,493 (3.4%)**	**217,287***

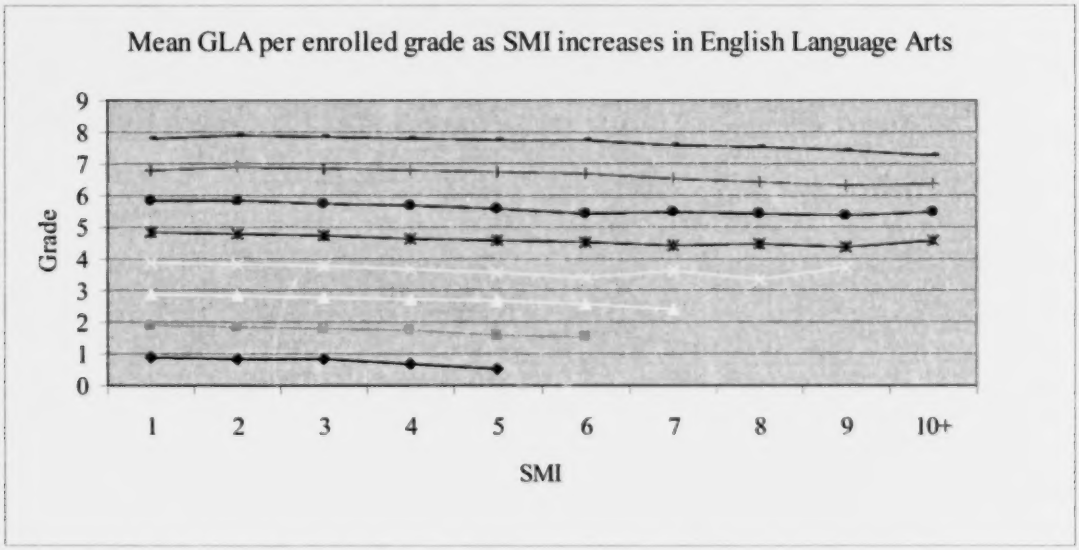
* 15 students are missing a student mobility indicator

The following two charts further examine the effect of student mobility on grade level of achievement in English Language Arts.

Table 25 - Student Mobility and English Language Arts by Enrolled Grade

English Language Arts – Student Mobility					
Enrolled Grade	**Mobility**	**GLA Equal or Above**	**GLA Below**	**GLA NA**	**Total**
1	High	3,382 (43.7%)	685 (8.8%)	296 (3.8%)	4,363 (18.4%)
	Low	15,661 (44.8%)	1,633 (4.7%)	2,030 (5.8%)	19,324 (81.6%)
2	High	6,104 (44.6%)	1,120 (8.2%)	358 (2.6%)	7,582 (31.7%)
	Low	13,645 (45.5%)	1,437 (4.8%)	1,264 (4.2%)	16,346 (68.3%)
3	High	7,411 (45.0%)	1,420 (8.6%)	227 (1.4%)	9,058 (37.9%)
	Low	13,111 (46.9%)	1,402 (5.0%)	323 (1.2%)	14,836 (62.1%)
4	High	3,589 (44.1%)	895 (11.0%)	70 (0.9%)	4,554 (19.0%)
	Low	17,025 (46.7%)	2,059 (5.7%)	316 (0.9%)	19,400 (81.0%)
5	High	4,446 (44.0%)	1,105 (10.9%)	100 (1.0%)	5,651 (23.7%)
	Low	15,841 (46.6%)	2,033 (6.0%)	314 (0.9%)	18,188 (76.3%)
6	High	5,834 (44.7%)	1,292 (9.9%)	92 (0.7%)	7,218 (29.4%)
	Low	15,342 (46.9%)	1,774 (5.4%)	248 (0.8%)	17,364 (70.6%)
7	High	4,702 (44.7%)	965 (9.2%)	159 (1.5%)	5,826 (24.0%)
	Low	16,728 (47.6%)	1,375 (3.9%)	311 (0.9%)	18,414 (76.0%)
8	High	5,130 (44.9%)	941 (8.2%)	225 (2.0%)	6,296 (25.9%)
	Low	16,222 (47.4%)	1,434 (4.2%)	315 (0.9%)	17,971 (74.1%)
9	High	6,107 (44.3%)	1,092 (7.9%)	473 (3.4%)	7,672 (30.8%)
	Low	15,405 (47.2%)	1,452 (4.4%)	374 (1.1%)	17,231 (69.2%)

The next graph shows the mean GLA values in English Language Arts for each grade broken down by the student mobility indicator.



* Categories with fewer than 20 students have been removed

In Grades 1 through 6 the majority of students have an SMI of 1 indicating that these students have not changed schools. In Grades 7 to 9 the majority of students have an SMI of 2 illustrating the usual pattern of moving to a new school for junior high.

Table 26 - Student Mobility Compared to GLA levels in Mathematics

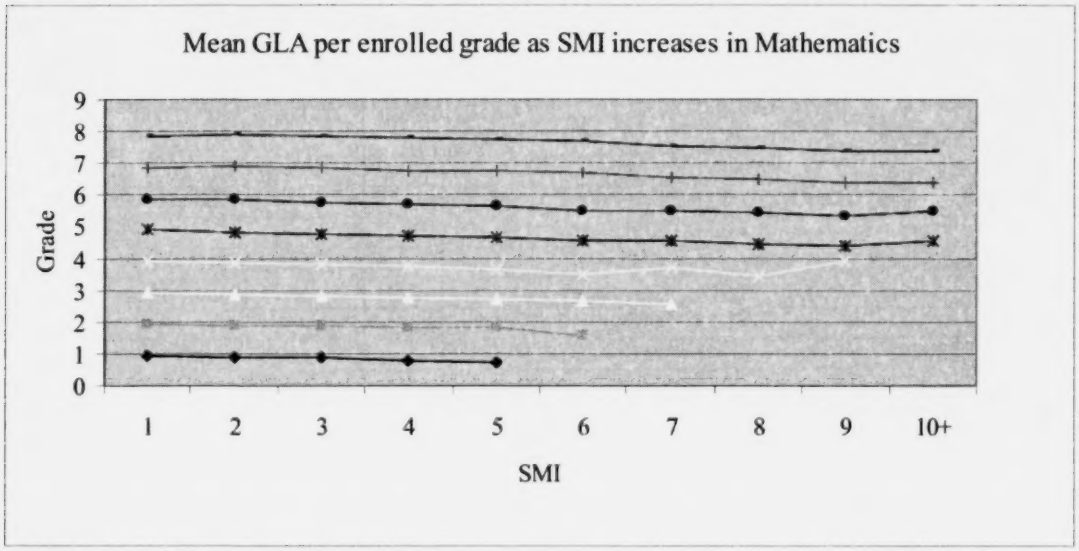
Students' GLA levels compared to Mobility Indicators in Mathematics				
Mobility Indicator	**GLA Equal or Above**	**GLA Below**	**GLA NA**	**Count**
1	174,522 (95.4%)	6,720 (3.7%)	1,615 (0.9%)	182,857
2	53,921 (89.7%)	5,247 (8.7%)	973 (1.6%)	60,141
3	25,724 (86.1%)	3,489 (11.7%)	666 (2.2%)	29,879
4	12,068 (82.0%)	2,236 (15.2%)	410 (2.8%)	14,714
5	5,970 (78.0%)	1,440 (18.8%)	241 (3.1%)	7,651
6	3,025 (74.1%)	870 (21.3%)	185 (4.5%)	4,080
7	1,501 (69.0%)	533 (24.5%)	142 (6.5%)	2,176
8	775 (64.6%)	335 (27.9%)	90 (7.5%)	1,200
9	429 (58.4%)	229 (31.2%)	77 (10.5%)	735
10-21	478 (58.2%)	245 (29.8%)	98 (11.9%)	821
Total	**191,446 (88.1%)**	**21,344 (9.8%)**	**4,497 (2.1%)**	**217,287***

* 15 students are missing a student mobility indicator

Table 27 - Student Mobility and Math by Enrolled Grade

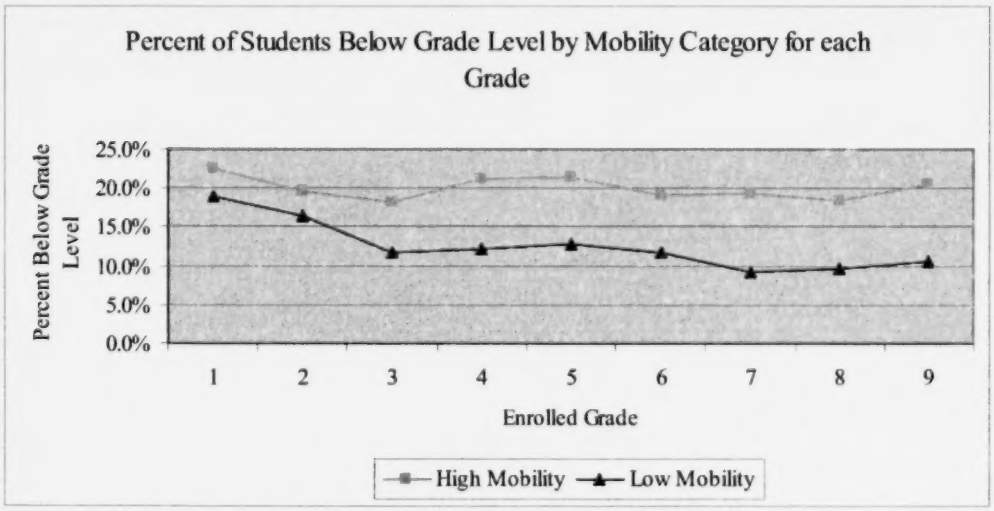
Math- Student Mobility					
Enrolled Grade	**Mobility**	**GLA Equal or Above**	**GLA Below**	**GLA NA**	**Total**
1	High	3,779 (86.6%)	475 (10.9%)	109 (2.5%)	4,363 (18.4%)
	Low	17,922 (92.7%)	989 (5.1%)	413 (2.1%)	19,324 (81.6%)
2	High	6,718 (88.6%)	754 (9.9%)	110 (1.5%)	7,582 (31.7%)
	Low	15,168 (92.8%)	947 (5.8%)	231 (1.4%)	16,346 (68.3%)
3	High	7,739 (85.4%)	1,128 (12.5%)	191 (2.1%)	9,058 (37.9%)
	Low	13,616 (91.8%)	999 (6.7%)	221 (1.5%)	14,836 (62.1%)
4	High	3,705 (81.4%)	784 (17.2%)	65 (1.4%)	4,554 (19.0%)
	Low	17,631 (90.9%)	1,536 (7.9%)	233 (1.2%)	19,400 (81.0%)
5	High	4,527 (80.1%)	1,021 (18.1%)	103 (1.8%)	5,651 (23.7%)
	Low	16,344 (89.9%)	1,606 (8.8%)	238 (1.3%)	18,188 (76.3%)
6	High	5,883 (81.5%)	1,239 (17.2%)	96 (1.3%)	7,218 (29.4%)
	Low	15,657 (90.2%)	1,520 (8.8%)	187 (1.1%)	17,364 (70.6%)
7	High	4,620 (79.3%)	1,027 (17.6%)	179 (3.1%)	5,826 (24.0%)
	Low	16,672 (90.5%)	1,406 (7.6%)	336 (1.8%)	18,414 (76.0%)
8	High	4,937 (78.4%)	1,096 (17.4%)	263 (4.2%)	6,296 (25.9%)
	Low	16,009 (89.1%)	1,574 (8.8%)	388 (2.2%)	17,971 (74.1%)
9	High	5,663 (73.8%)	1,446 (18.8%)	563 (7.3%)	7,672 (30.8%)
	Low	14,859 (86.2%)	1,799 (10.4%)	573 (3.3%)	17,231 (69.2%)

The mean GLA values for Math in each grade were plotted against SMI values to produce the following chart. Once again, aside from the first grade there is a gradual decrease in the mean GLA as the SMI increases.



* Categories with less than 20 students have been removed

The following graph illustrates the effect mobility can have on achievement.



As the graph above illustrates, there is a noticeable effect between high and low mobility. There is a statistically significant difference between the mobility groups in Grades 4 through 9. This significance may indicate that mobility has a more pronounced effect as students age. It may also

be due to the likelihood of students having a higher mobility indicator as their enrolled grade increases.

Correlations between SMI and GLA

Kendall's tau-b values were calculated in order to illustrate the relationship between SMI and GLA groupings. Kendall's tau-b is an alternative non-parametric form of rank correlations. The tau-b is used as an inferential statistic to show the strength of those relationships. Tau-b is used to measure the association between student mobility and GLA. This particular test was chosen as it uses ordinal level data based on pair by pair comparisons. The chart below details the correlations.

Table 28 - SMI by GLA, Tau-b Calculations

SMI by GLA- Grade and Subject	05-06 Tau-b	06-07 Tau-b
Eng. LA and SMI	0.096*	0.103*
Math and SMI	0.126*	0.117*

* correlation is significant at the 0.01 level.

The above correlations between student mobility and GLA are significant at the 0.01 level in both years. They are relatively weak in strength, although this is to be expected as student mobility can affect a student's GLA but is only one of many determining variables. The correlations are similar between the two years of data indicating the validity of the data.

Students not on a Graded Curriculum (Modified Programming)

There were 3,380 students not on a graded curriculum in this study. The students were assessed based on the degree of achievement in their Individual Program Plans (IPP's) relative to their foundational skills, academic readiness skills and life skills. The results reported below should be considered preliminary as data will become more meaningful as multi-year trends become available.

Table 29 - IPP Foundation Skills

Foundation Skills	Number of Students	Percent of Total Enrolled (%)
All skills attained	558	16.5%
Most skills attained	1,078	31.9%
Some skills attained	1,015	30.0%
None of the skills attained	111	3.3%
N/A	618	18.3%
Total	**3,380**	**100.0%**

Table 30 - IPP Academic Readiness Skills

Academic Readiness Skills		
	Number of Students	**Percent of Total Enrolled (%)**
All skills attained	486	14.4%
Most skills attained	1,087	32.2%
Some skills attained	1,266	37.5%
None of the skills attained	156	4.6%
N/A	385	11.4%
Total	**3,380**	**100.0%**

Table 31 - IPP Life Skills

Life Skills		
	Number of Students	**Percent of Total Enrolled (%)**
All skills attained	397	11.7%
Most skills attained	995	29.4%
Some skills attained	878	25.9%
None of the skills attained	80	2.4%
N/A	1,030	30.5%
Total	**3,380**	**100.0%**

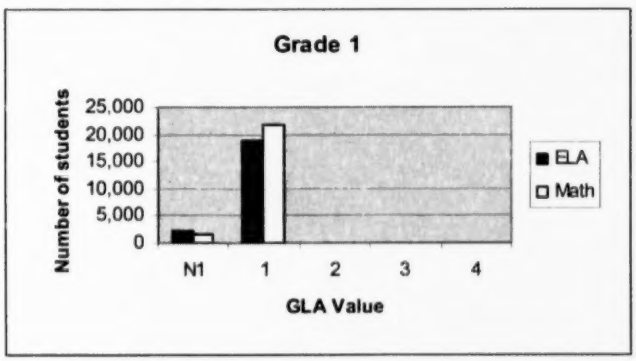
GLA and Enrolled Grade

The following tables and graphs show GLA values by enrolled grade for all students, in English Language Arts and Math. N1 indicates students that are not yet at the Grade 1 level.

Grade Level of Achievement by Enrolled Grade

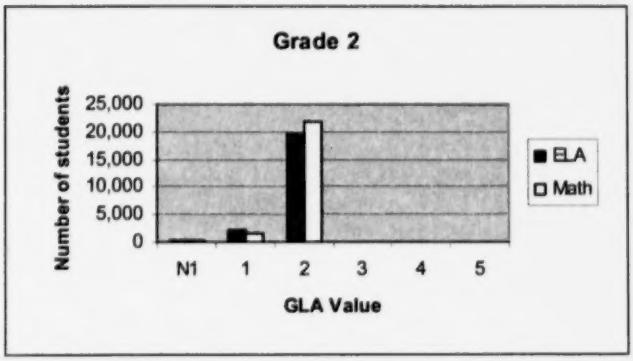
Grade One

Grade Level	ELA	% of Total	Math	% of Total
N1	2,320	9.8%	1465	6.2%
1	18,962	80.0%	21649	91.4%
2	77	0.3%	50	0.2%
3	3	0.0%	3	0.0%
4	1	0.0%	1	0.0%
Missing	2,329	9.8%	524	2.2%
Total	**23,692**	**100.0%**	**23692**	**100.0%**



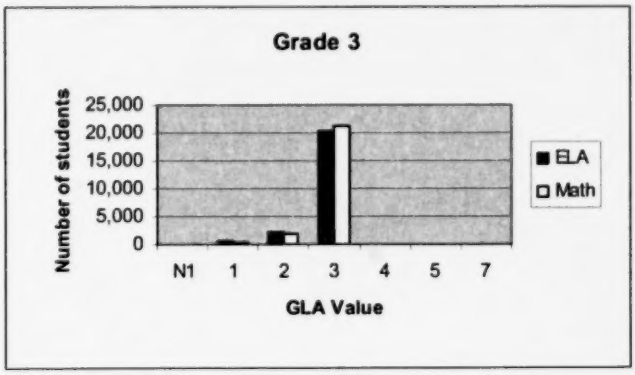
Grade Two

Grade Level	ELA	% of Total	Math	% of Total
N1	333	1.4%	189	0.8%
1	2,224	9.3%	1,512	6.3%
2	19,676	82.2%	21,825	91.2%
3	59	0.2%	54	0.2%
4	13	0.1%	7	0.0%
5	1	0.0%	1	0.0%
Missing	1,623	6.8%	341	1.4%
Total	**23,929**	**100.0%**	**23,929**	**100.0%**



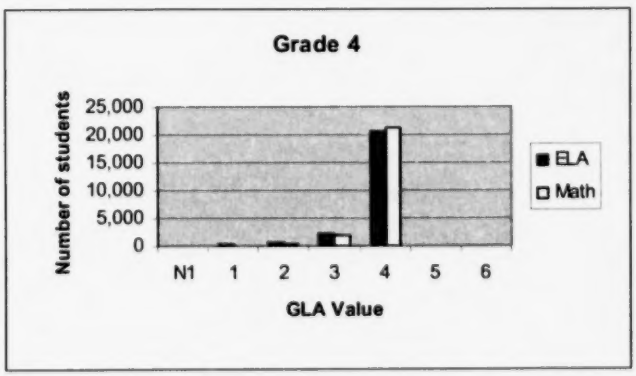
Grade Three

Grade Level	ELA	% of Total	Math	% of Total
N1	85	0.4%	60	0.3%
1	531	2.2%	305	1.3%
2	2,206	9.2%	1,763	7.4%
3	20,436	85.5%	21,268	89.0%
4	82	0.3%	87	0.4%
5	3	0.0%	0	0.0%
7	1	0.0%	0	0.0%
Missing	552	2.3%	413	1.7%
Total	**23,896**	**100.0%**	**23,896**	**100.0%**



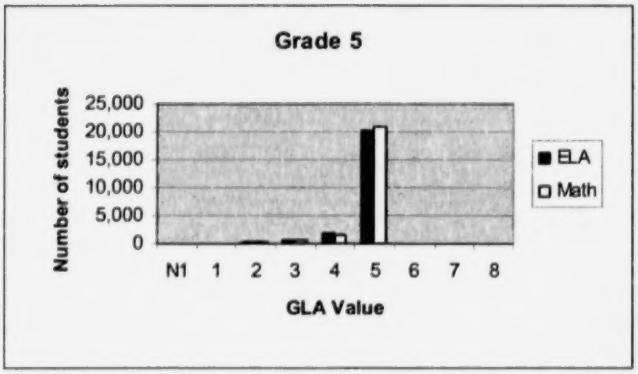
Grade Four

Grade Level	ELA	% of Total	Math	% of Total
N1	49	0.2%	24	0.1%
1	244	1.0%	97	0.4%
2	560	2.3%	467	1.9%
3	2,101	8.8%	1,732	7.2%
4	20,529	85.7%	21,255	88.7%
5	84	0.4%	77	0.3%
6	1	0.0%	4	0.0%
Missing	386	1.6%	298	1.2%
Total	**23,954**	**100.0%**	**23,954**	**100.0%**



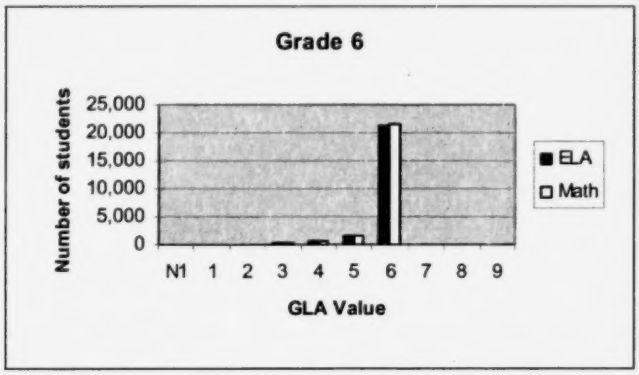
Grade Five

Grade Level	ELA	% of Total	Math	% of Total
N1	30	0.1%	16	0.1%
1	109	0.5%	73	0.3%
2	264	1.1%	206	0.9%
3	741	3.1%	624	2.6%
4	1,994	8.4%	1,708	7.2%
5	20,215	84.8%	20,794	87.2%
6	67	0.3%	76	0.3%
7	4	0.0%	1	0.0%
8	1	0.0%	0	0.0%
Missing	414	1.7%	341	1.4%
Total	**23,839**	**100.0%**	**23,839**	**100.0%**



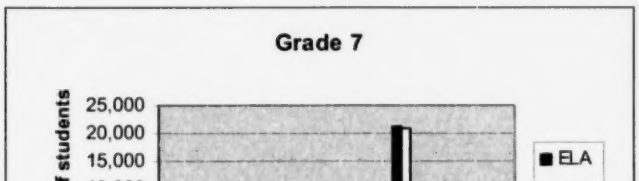
Grade Six

Grade Level	ELA	% of Total	Math	% of Total
N1	26	0.1%	16	0.1%
1	62	0.3%	25	0.1%
2	155	0.6%	101	0.4%
3	365	1.5%	326	1.3%
4	765	3.1%	717	2.9%
5	1,693	6.9%	1,574	6.4%
6	21,144	86.0%	21,485	87.4%
7	25	0.1%	52	0.2%
8	7	0.0%	2	0.0%
9	0	0.0%	1	0.0%
Missing	340	1.4%	283	1.2%
Total	**24,582**	**100.0%**	**24,582**	**100.0%**



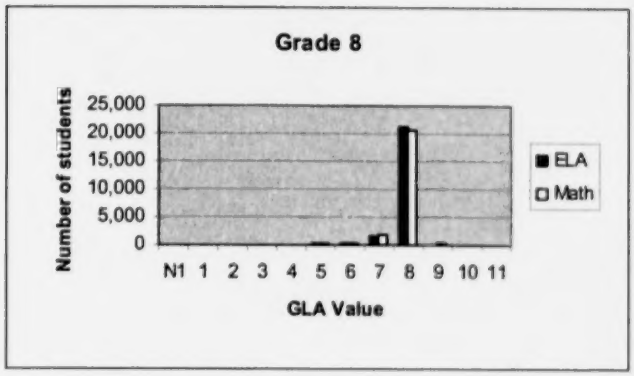
Grade Seven

Grade Level	ELA	% of Total	Math	% of Total
N1	7	0.0%	7	0.0%
1	26	0.1%	10	0.0%
2	57	0.2%	33	0.1%
3	147	0.6%	122	0.5%
4	247	1.0%	243	1.0%
5	491	2.0%	427	1.8%
6	1,365	5.6%	1,591	6.6%
7	21,369	88.2%	21,078	87.0%
8	54	0.2%	177	0.7%
9	6	0.0%	37	0.2%
10	1	0.0%	0	0.0%
Missing	470	1.9%	515	2.1%
Total	**24,240**	**100.0%**	**24,240**	**100.0%**



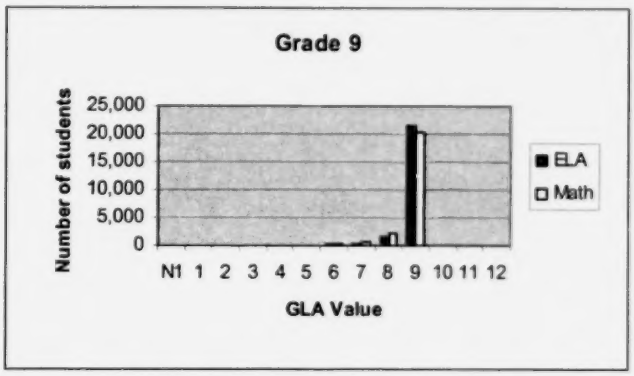
Grade Eight

Grade Level	ELA	% of Total	Math	% of Total
N1	3	0.0%	5	0.0%
1	9	0.0%	2	0.0%
2	33	0.1%	22	0.1%
3	71	0.3%	61	0.3%
4	145	0.6%	102	0.4%
5	216	0.9%	204	0.8%
6	460	1.9%	438	1.8%
7	1,438	5.9%	1,836	7.6%
8	21,317	87.8%	20,706	85.3%
9	30	0.1%	230	0.9%
10	3	0.0%	8	0.0%
11	1	0.0%	2	0.0%
Missing	541	2.2%	651	2.7%
Total	**24,267**	**100.0%**	**24,267**	**100.0%**



Grade Nine

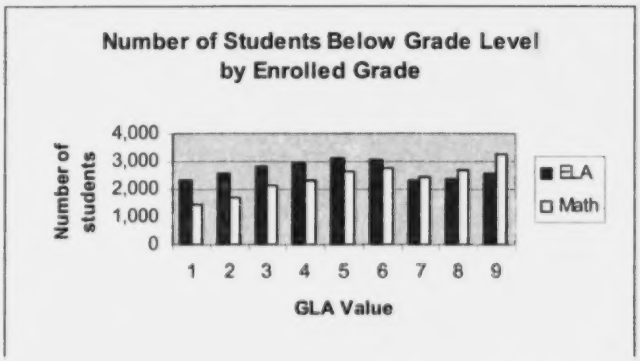
Grade Level	ELA	% of Total	Math	% of Total
N1	7	0.0%	8	0.0%
1	10	0.0%	4	0.0%
2	8	0.0%	14	0.1%
3	42	0.2%	32	0.1%
4	73	0.3%	77	0.3%
5	127	0.5%	99	0.4%
6	210	0.8%	208	0.8%
7	400	1.6%	498	2.0%
8	1,667	6.7%	2,305	9.3%
9	21,500	86.3%	20,366	81.8%
10	11	0.0%	151	0.6%
11	0	0.0%	5	0.0%
12	1	0.0%	0	0.0%
Missing	847	3.4%	1,136	4.6%
Total	**24,903**	**100.0%**	**24,903**	**100.0%**



Using the student counts from the above tables, the number of students whose GLA is below grade level in each grade are shown in the graph below. From Grade 1 to 6 there are a higher number of students attaining below grade level in English Language Arts. In Grade 7 to 9 there are a higher number of students attaining below grade level in Mathematics.

Number of Students Below Grade Level by Enrolled Grade

Grade Level	ELA	% of Total	Math	% of Total
1	2,320	9.6%	1,465	6.9%
2	2,557	10.6%	1,701	8.0%
3	2,822	11.7%	2,128	10.0%
4	2,954	12.2%	2,320	10.9%
5	3,138	13.0%	2,627	12.3%
6	3,066	12.7%	2,759	12.9%
7	2,340	9.7%	2,433	11.4%
8	2,375	9.8%	2,670	12.5%
9	2,544	10.5%	3,245	15.2%
Total	24,116	100.0%	21,348	100.0%



Correlations between GLA and Enrolled Grade by Sub-Groups of the Population

Correlations between the students' GLAs and enrolled grades were calculated using Spearman's rho to determine the "goodness of fit" between GLA and enrolled grade related to students' being "coded" or not. The correlation between the two variables reflects the degree to which they "move" together. In this case, a high positive correlation coefficient results when an increase in enrolled grade is mirrored by the same increase in grade level of achievement. As was expected, GLA was highly correlated to enrolled grade, meaning the enrolled grade of a student typically matches their GLA. In English Language Arts this relationship was strongest for the gifted students, while students with severe disabilities had the lowest correlation between GLA and enrolled grade. In Math, the relationship was strongest for the non-coded students while students with severe disabilities had the lowest correlation. A comparison to the 2005-06 GLA correlations is shown in the tables below.

Table 32 - Correlations between GLA and Enrolled Grade, ELA

English GLA		
Student Codes	**2005-06 Correlation Coefficient**	**2006-07 Correlation Coefficient**
Non-Coded	.991**	.991**
Severe Disabilities	.853**	.868**
Mild/Moderate Disabilities	.845**	.896**
Gifted	.994**	.994**
ESL Canadian Born (303)	.974**	.966**
ESL Foreign Born (301)	.925**	.945**

**Correlation is significant at the 0.01 level (2-tailed)

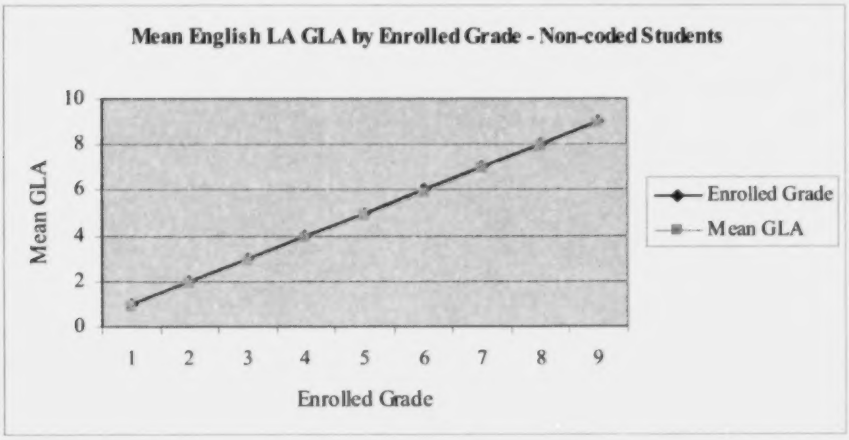
Table 33 - Correlations between GLA and Enrolled Grade, Math

	Mathematics	
Student Codes	**2005-06 Correlation Coefficient**	**2006-07 Correlation Coefficient**
Non-Coded	.994*	.992**
Severe Disabilities	.863**	.874**
Mild/Moderate Disabilities	.854**	.901**
Gifted	.980**	.984**
ESL Canadian Born (303)	.985**	.975**
ESL Foreign Born (301)	.974**	.971**

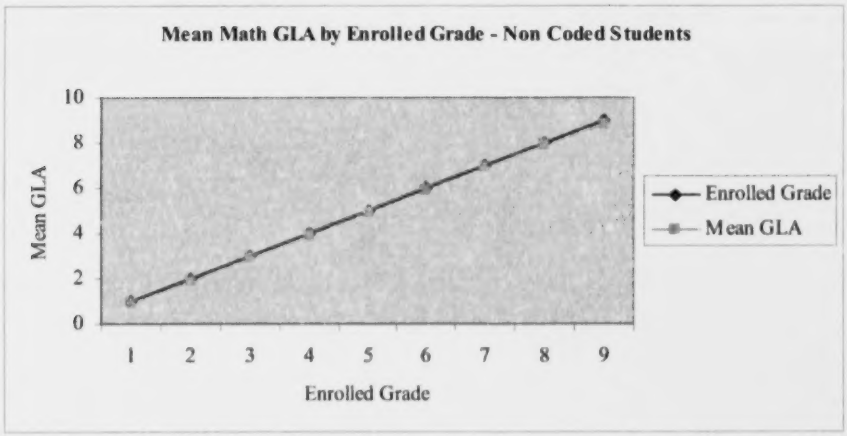
** Correlation is significant at the 0.01 level (2-tailed).

The graphs (next pages) show GLA by enrolled grade for all students as well as sub-populations of students, in English Language Arts and Math. The mean GLA value is plotted against the enrolled grade to show graphically the degree to which students' GLA reflects or departs from their enrolled grade relative to sub-group affiliations. As anticipated, the first two graphs demonstrate the close relationship between enrolled grade and GLA for non-coded students. This pattern is parallel to the high percentage of students who attain the acceptable standard on provincial achievement tests.

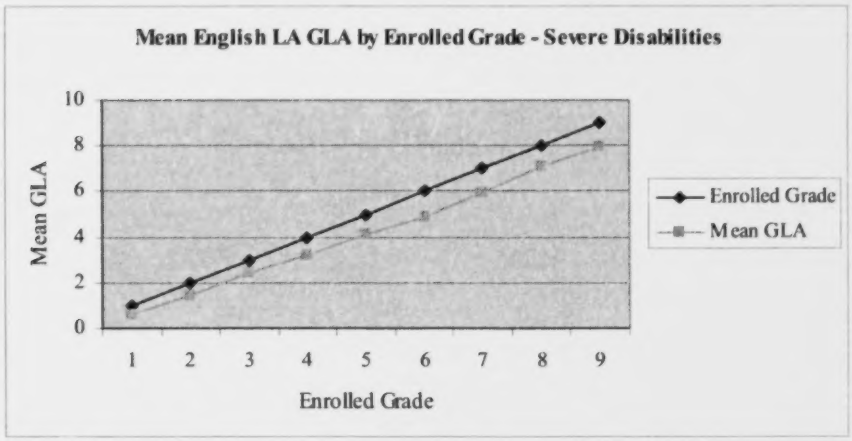
Non-Coded Students – English Language Arts



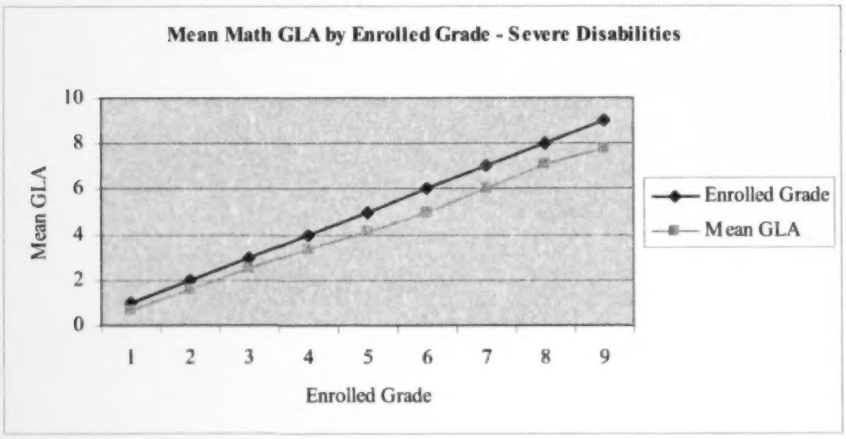
Non-Coded Students – Mathematics



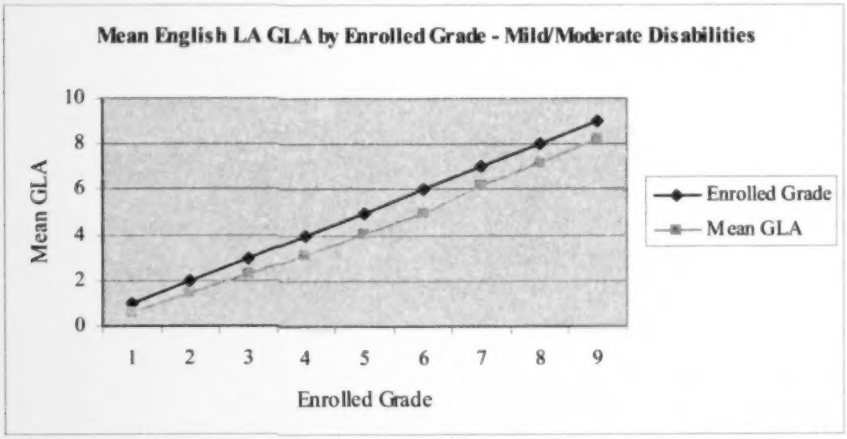
Students with Severe Disabilities- English Language Arts



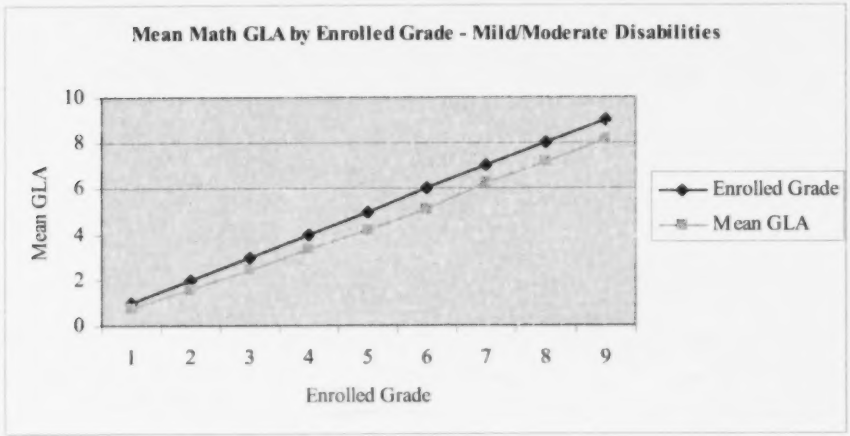
Students with Severe Disabilities – Mathematics



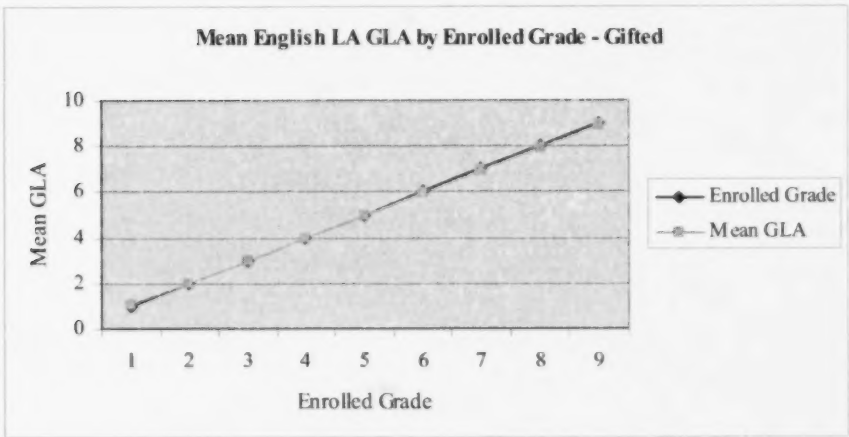
Students with Mild/Moderate Disabilities – English Language Arts



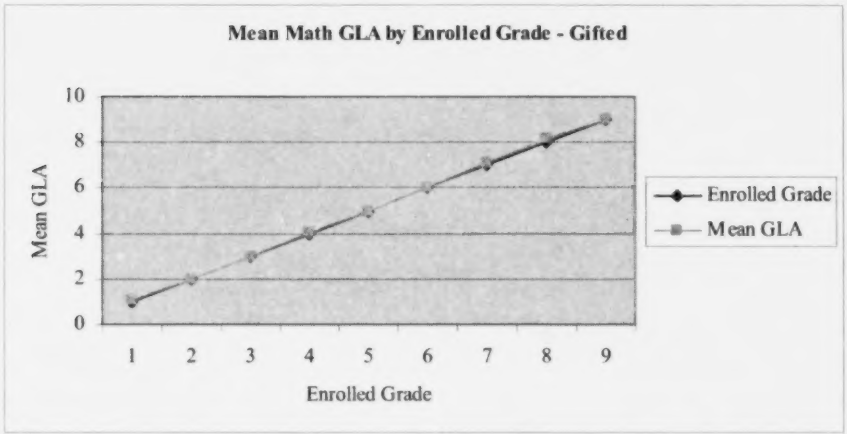
Students with Mild/Moderate Disabilities – Mathematics



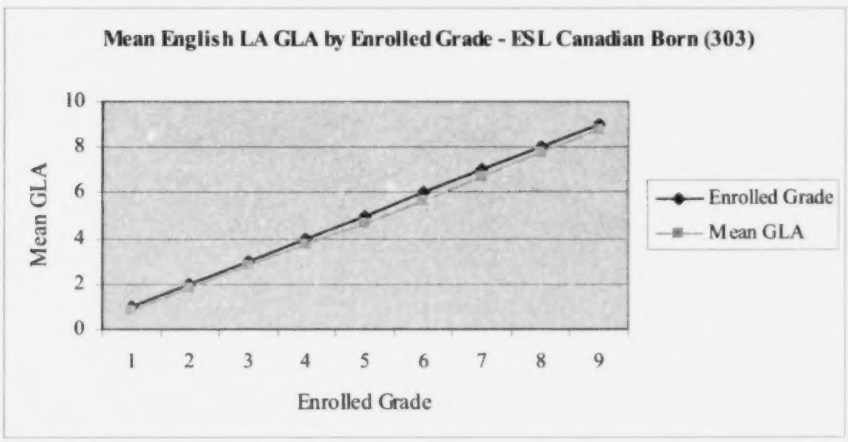
Gifted Students – English Language Arts



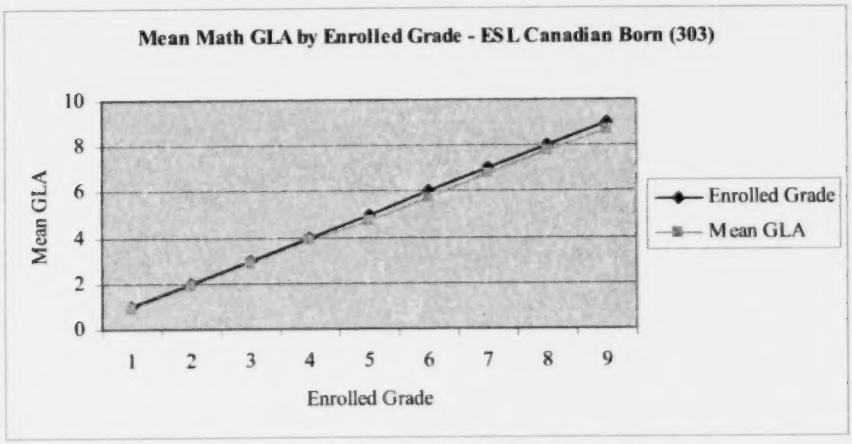
Gifted Students – Mathematics



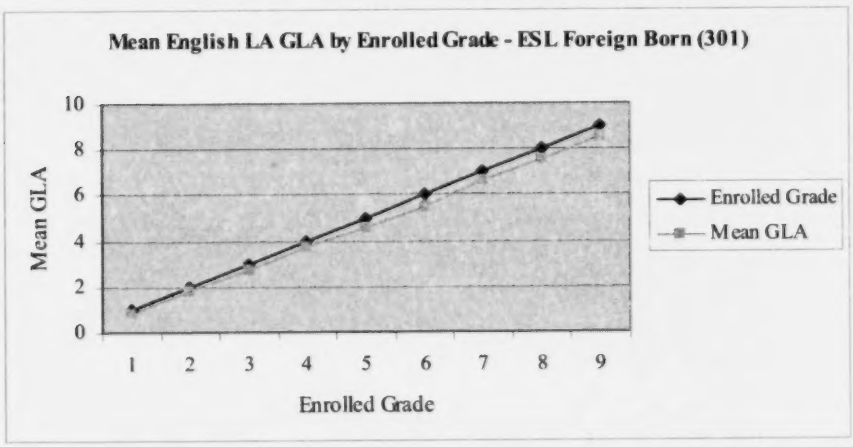
ESL Canadian-Born Students – English Language Arts



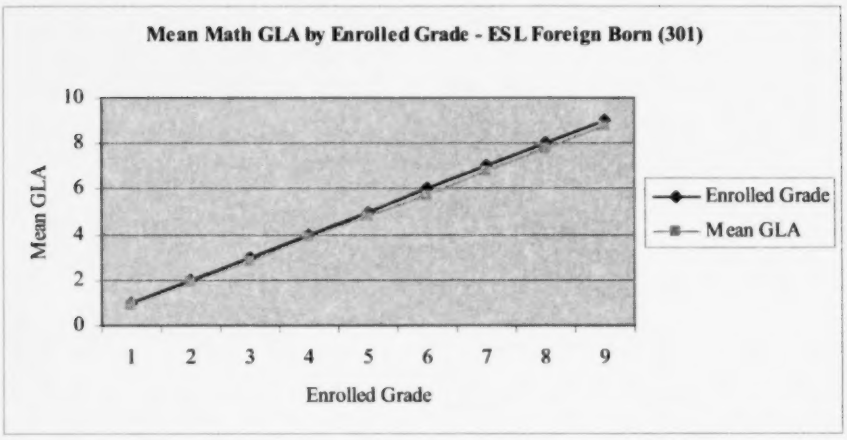
ESL Canadian-Born Students – Mathematics



ESL Foreign-Born Students – English Language Arts



ESL Foreign-Born Students – Mathematics



Discussion

The graphs above yield some interesting observations:

- The relationship between enrolled grade and GLA for non-coded students is very close as was expected.
- The variance between enrolled grade and GLA tends to increase through the elementary grades and peaks at grade 6 and grade 9 for students with a severe disability.
- A similar pattern is seen for students with a mild/moderate disability, but the peak in grade nine is absent.
- Gifted students are more likely to have a GLA above enrolled grade in Mathematics than in Language Arts.
- Foreign-born and Canadian-born ESL students' GLA distributions are relatively similar.
- Foreign-born ESL students seem to have a GLA on par with their enrolled grade in mathematics up until Grade 5. In English Language Arts the two variables diverge as early as Grade 2.

Birth Month-Combined Grades

The following table shows the breakdown of student birth month. When grade levels are combined there is a relatively equal distribution of students across birth months, but with fewer students in the second January and February categories.

Table 34 – Student Birth Month

Student Birth Month		
Month	**Frequency**	**Percentage**
1st January	11,177	5.7%
1st February	11,912	6.1%
March	17,987	9.2%
April	17,778	9.1%
May	18,457	9.5%
June	17,424	8.9%
July	17,676	9.1%
August	17,037	8.7%
September	16,202	8.3%
October	14,840	7.6%
November	12,865	6.6%
December	10,944	5.6%
2nd January	6,380	3.3%
2nd February	4,409	2.3%
Total	195,088*	100.0%

*Not all students were included in this table as some students were outside the parameters of analysis meaning they were much older than the students being examined in this table.

The table above illustrates the distribution of students by birth month for all grades of students. The distribution was calculated by examining each grade individually and then combining all grades. Students in the 1st January and February are usually the oldest students in each grade, whereas students in the 2nd January and February are the youngest in each grade.

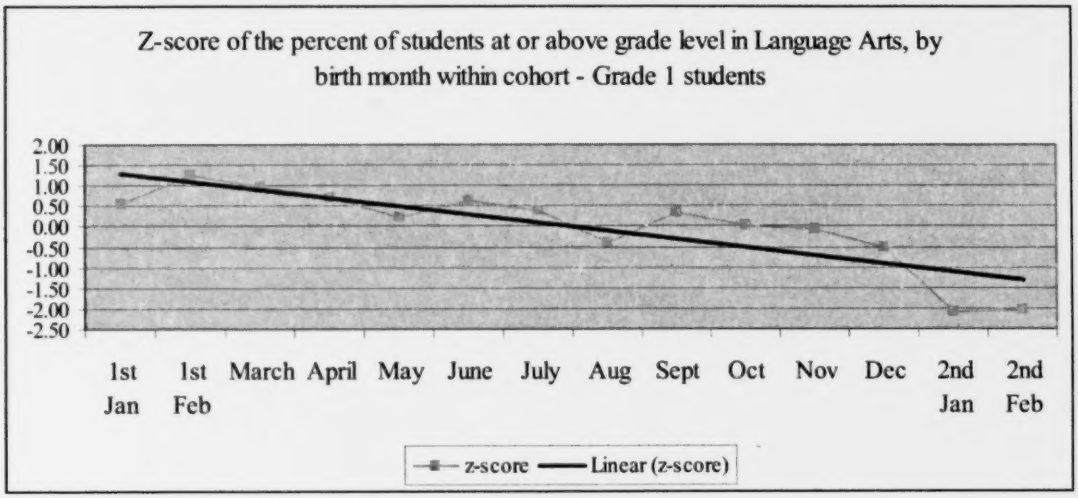
GLA and PAT by Age within Grade Cohorts

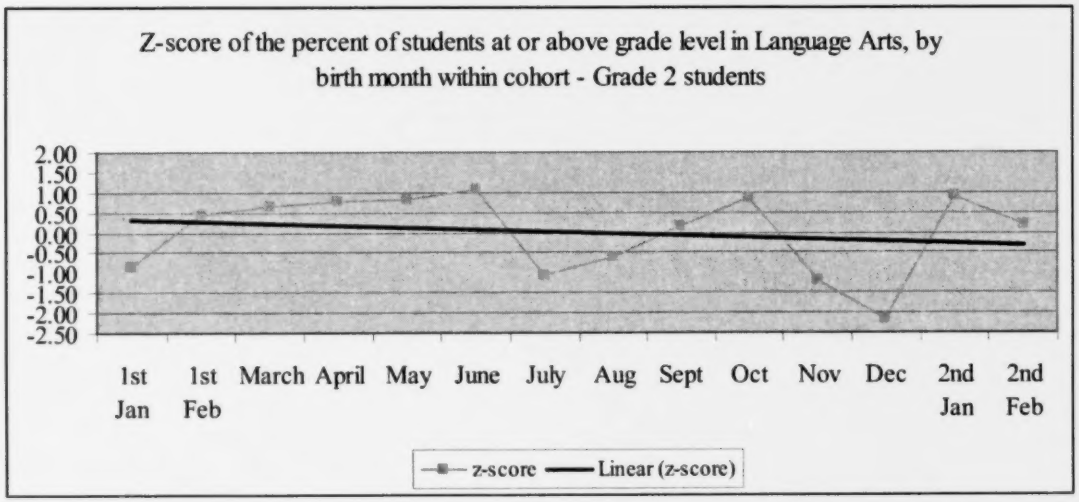
Previous Alberta Education studies have indicated that there is a relative age effect between average PAT scores and birth month within grade cohorts, where older students tend to have higher average test scores than the younger students when measured by the z-score of average PAT results for each birth month group (Alberta Learning, 2001).

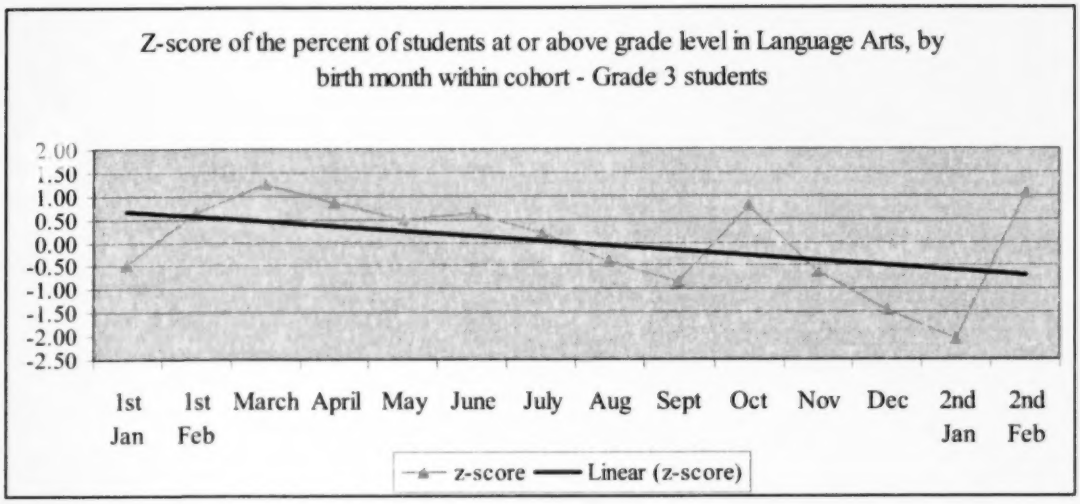
A comparative analysis was undertaken using GLA data. The percentages of students 'at or above' their grade level in English Language Arts and Math were converted to z-scores[8] and plotted. (See graphs below). There is a noticeable age effect Grades 1 through 5, which is most pronounced in Grade 1. In Grade 1, 1st January to October are statistically significant when compared to 2nd January and 2nd February.

[8] Z-scores or standard scores convert a distribution of a set of scores to a normal distribution that allows a more consistent analysis of the data. A z-score of +1.0 represents a score equal to one standard deviation above the mean.

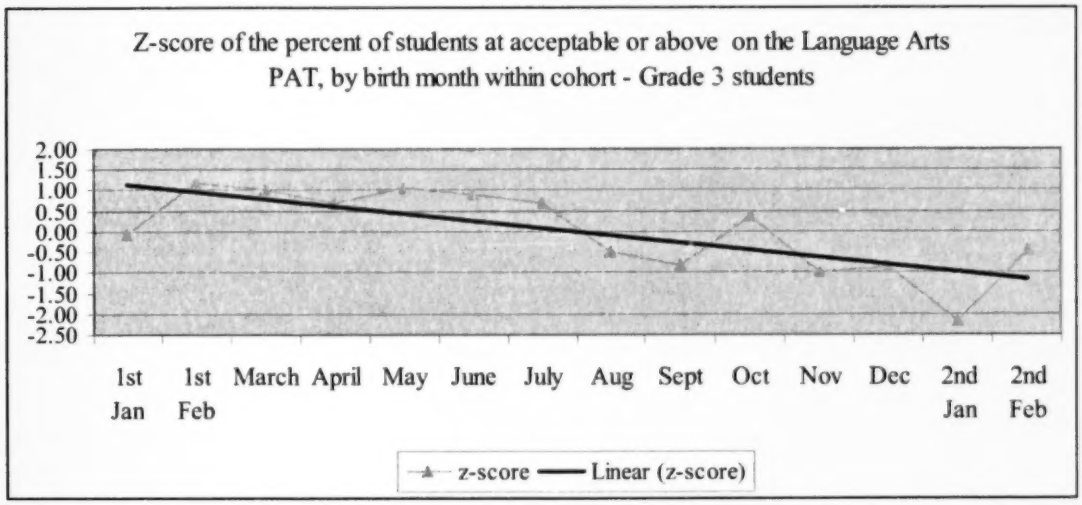
The following graphs were produced using the z-scores for Grades 1 through 5, English Language Arts GLAs for students in the GLA dataset.

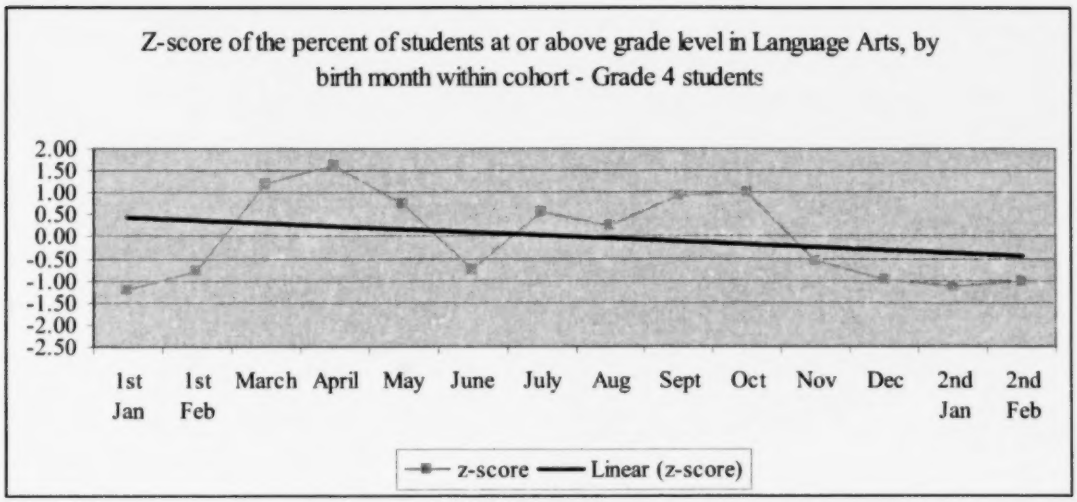


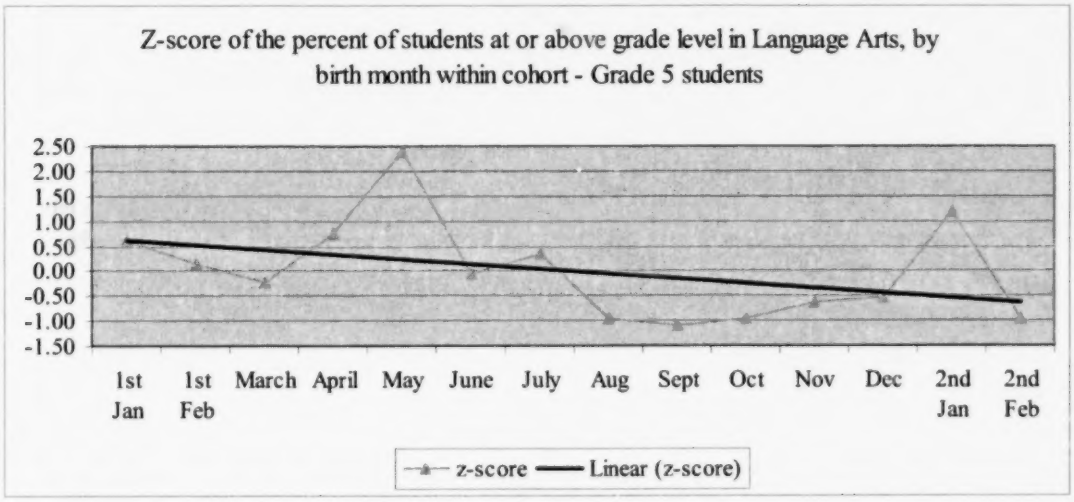




The graph below demonstrates that when PAT scores are recoded into "percent at or above acceptable" to mimic the GLA data, the relative age effect remains. In Grade 3, March and April are statistically significant when compared to 2nd January.







In Grade 5, May is statistically significant when compared to August, September and October.

Discussion

The age effect, which illustrates that younger students achieve at a lower level than those students born earlier in the year, is apparent in English Language Arts in Grades 1 through 5. After Grade 5, the age effect tapers off and is no longer apparent. In this sample the age effect persisted longer than in previous analyses of GLA data where the effect dissipated by Grade 3.

GLA at a Glance

The following table shows all groups of students and their GLA in Mathematics and English Language Arts including students for whom GLA data was either not available or not applicable.

Table 35 - GLA Overall Summary Table, Including 'GLA NA'

Overall Summary Table		Mathematics			English Language Arts		
Student Codes	**Frequency**	**% At or Above**	**% Below**	**% GLA NA**	**% At or Above**	**% Below**	**% GLA NA**
Provincial Sample	217,302	88.1%	9.8%	2.1%	85.4%	11.1%	3.5%
Non coded	170,637	92.4%	6.1%	1.5%	90.6%	6.6%	2.9%
Severe Disability	5,303	55.3%	38.1%	6.5%	53.7%	39.6%	6.7%
- Emotional/Behavioural Disability	2,925	58.8%	35.9%	5.2%	56.7%	38.0%	5.3%
- Physical or Medical Disability	1,976	52.7%	39.6%	7.6%	52.4%	40.0%	7.7%
- Multiple Disability	204	28.9%	56.4%	14.7%	27.0%	56.9%	16.2%
- Deafness	117	46.2%	46.2%	7.7%	35.9%	54.7%	9.4%
- Blindness	68	77.9%	20.6%	1.5%	72.1%	25.0%	2.9%
Mild/Moderate Disability	16,769	56.2%	39.9%	3.8%	51.9%	44.3%	3.8%
- Learning Disability	7,726	60.2%	37.4%	2.3%	55.1%	43.0%	1.9%
- Mild Cognitive Disability	2,923	21.6%	68.7%	9.7%	21.0%	69.8%	9.2%
- Communication Disability	2,330	72.1%	25.3%	2.5%	59.8%	36.1%	4.1%
- Emotional/Behavioural Disability	1,766	69.6%	27.9%	2.4%	72.1%	25.8%	2.2%
- Physical/Medical Disability	870	70.2%	26.7%	2.9%	67.7%	28.6%	3.7%
- Multiple Disability	862	53.3%	44.4%	2.2%	48.6%	48.8%	2.6%
- Hearing Disability	173	76.3%	20.2%	3.5%	76.3%	20.8%	2.9%
- Moderate Cognitive Disability	93	11.8%	64.5%	23.7%	9.7%	67.7%	22.6%
- Visual Disability	25	96.0%	4.0%	0.0%	92.0%	8.0%	0.0%
Provincial Sample	217,302	88.1%	9.8%	2.1%	85.4%	11.1%	3.5%
Gifted	3,314	96.9%	2.2%	0.9%	96.8%	2.3%	0.7%
ESL Cdn-Born	11,795	83.6%	12.6%	3.8%	77.6%	16.1%	6.2%
ESL Foreign-Born	11,139	83.4%	11.3%	5.3%	72.3%	18.5%	9.1%
Gender							
- Males	111,372	87.2%	10.6%	2.2%	83.2%	13.3%	3.6%
- Females	105,930	89.1%	9.0%	1.9%	87.9%	8.8%	3.3%
Student Mobility							
- High	58,220	81.7%	15.4%	2.9%	80.2%	16.3%	3.4%
- Low	159,074	90.5%	7.8%	1.8%	87.4%	9.2%	3.5%
Birth Month							
- March to Sept	122,561	89.6%	8.6%	1.9%	87.1%	9.6%	3.3%
- Oct to 2nd Feb	49,438	88.8%	9.2%	2.0%	86.1%	10.5%	3.4%

Note: The categories of 'at grade level' and 'above grade level' have been combined. There are not enough cases in the 'above grade level' category to be shown separately.

The following table shows all groups of students and their GLA in Mathematics and English Language Arts excluding students for whom GLA data was either not available or not applicable. In this table asterisks indicate significant differences between a specific cohort of students and the non-coded cohort. This analysis is important as it points to factors that may be limiting academic success for cohorts of students who are most at risk of under-achievement and thus would benefit from more focused systemic responsiveness to their learning needs.

Table 36 - GLA Overall Summary Table, Excluding 'GLA NA'

Overall Summary Table	Mathematics			English Language Arts		
Student Codes	**Frequency**	**% At or Above**	**% Below**	**Frequency**	**% At or Above**	**% Below**
Provincial Sample	212,801	90.0%	10.0%	209,804	88.5%	11.5%
Non coded	168,053	93.8%	6.2%	165,746	93.2%	6.8%
Severe Disability	4,957	59.2%*	40.8%*	4,948	57.5%*	42.5%*
- Emotional/Behavioural Disability	2,773	62.1%	37.9%	2,771	59.9%	40.1%
- Physical or Medical Disability	1,825	57.2%	42.8%	1,824	56.7%	43.3%
- Multiple Disability	174	33.9%	66.1%	171	32.2%	67.8%
- Deafness	108	50.0%	50.0%	106	39.6%	60.4%
- Blindness	67	79.1%	20.9%	66	74.2%	25.8%
Mild/Moderate Disability	16,133	58.5%*	41.5%*	16,139	54.0%*	46.0%*
- Learning Disability	7,549	61.7%	38.3%	7,578	56.1%	43.9%
- Mild Cognitive Disability	2,638	23.9%	76.1%	2,653	23.2%	76.8%
- Communication Disability	2,271	74.1%	25.9%	2,235	62.3%	37.7%
- Emotional/Behavioural Disability	1,723	71.4%	28.6%	1,728	73.7%	26.3%
- Physical/Medical Disability	844	72.4%	27.6%	838	70.3%	29.7%
- Multiple Disability	843	54.6%	45.4%	840	49.9%	50.1%
- Hearing Disability	167	79.0%	21.0%	168	78.6%	21.4%
- Moderate Cognitive Disability	71	15.5%	84.5%	72	12.5%	87.5%
- Visual Disability	25	96.0%	4.0%	25	92.0%	8.0%
Provincial Sample	212,801	90.0%	10.0%	209,804	88.5%	11.5%
Gifted	3,284	97.7%*	2.3%*	3,289	97.6%*	2.4%*
ESL Cdn-Born	11,350	87.0%*	13.0%*	11,059	82.8%*	17.2%*
ESL Foreign-Born	10,554	88.1%*	11.9%*	10,121	79.6%*	20.4%*
Gender						
- Males	108,915	89.1%*	10.9%*	107,412	86.2%*	13.7%*
- Females	103,886	90.9%*	9.1%*	102,392	90.9%*	9.1%*
Student Mobility						
- High	56,541	84.1%*	15.9%*	56,220	83.1%*	16.9%*
- Low	156,254	92.1%*	7.9%*	153,579	90.4%*	9.6%*
Birth Month						
- March to Sept	120,281	91.3%*	8.7%*	118,533	90.0%*	10.0%*
- Oct to Feb	48,429	90.7%*	9.3%*	47,765	89.1%*	10.9%*

Note: The categories of 'at grade level' and 'above grade level' have been combined. There are not enough cases in the 'above grade level' category to be shown separately.

*Denotes a significant difference at $p<0.001$ when compared to the non-coded sample of students.

Note: Statistical testing was only done with the larger categories, disability types (severe and mild/moderate) were not tested against the non-coded sample.

Comparison of GLA and PAT data

The GLA by PAT analysis demonstrates that GLA data can indeed supplement PAT data with reasonable reliability and validity.

Correlations between PAT and GLA

Kendall's tau-b was used to measure the association between PAT and GLA. This particular test was chosen as it uses ordinal level data based on pair by pair comparisons. The chart below details the correlations for 2005-06 and 2006-07.

The PAT and GLA variables were re-coded into the dichotomous categories: either 'Below Acceptable', or 'At or Above Acceptable' for PATs; and either 'Below Grade Level' or 'At or Above Grade Level' for GLA, and then the two dichotomous variables were compared. All relationships tested were at the $p < .01$ levels meaning they were significant. The p-value shows that the observed relationships are not due to chance. The following tables shows all tau-b values for the relationships tested and from this, one can conclude that the relationships are moderate in strength. A perfect relationship of 1.0 between GLA and PAT is neither an expected nor a desirable condition given the inherent differences in the evaluation designs which would underlie potentially different learning outcomes being measured with different assessment methods.

Table 37 - PAT by GLA Tau-b Calculations

2005-06

PAT by GLA- Grade and Subject	Tau-b
Gr. 3 Eng. LA	.378
Gr. 6 Eng. LA	.406
Gr. 9 Eng. LA	.338
Gr. 3 Math	.388
Gr. 6 Math	.403
Gr. 9 Math	.399

2006-07

PAT by GLA- Grade and Subject	Tau-b
Gr. 3 Eng. LA	.324
Gr. 6 Eng. LA	.337
Gr. 9 Eng. LA	.323
Gr. 3 Math	.342
Gr. 6 Math	.366
Gr. 9 Math	.409

When comparing 2005-06 to 2006-07, the strength of the relationships has decreased. This decrease in strength may be attributed to the larger sample size in 2006-07 and therefore may be a truer picture than the correlations of the previous year. The only exception is the increase in strength of the relationship between the Grade 9 PAT and GLA results.

GLA by PAT Analysis-Comparisons Using Achievement Levels

In order to further examine the relationship between the GLA data and provincial achievement tests (PATs) and provide an additional perspective on these relationships, both PAT and GLA data were again re-coded into the categories of 'Below Grade Level and GLA NA' and 'At or Above Grade Level' for GLA; and 'Acceptable or Excellence' and 'Below Acceptable and Excused or Absent' for PATs. These groupings were chosen based on the current Alberta Education standard for cohort reporting. The groups were then cross-tabulated with the hypothesis being that students who score at or above the acceptable level on PATs tend to be at or above grade level, and likewise those that score below acceptable tend to be below grade level. The following tables show some support for the hypothesis, as 76-78% of the students in Language Arts and 65-80% of the students in Math who are at grade level are also at or above the acceptable level on the PATs. The data in the following tables includes all students from schools that submitted GLA data for 2006-07 in Grades 3, 6 or 9.

Table 38 - Comparison of English Language Arts PAT and GLA

Comparison of English Language Arts PAT and GLA				
		Grade Level of Achievement – English Language Arts		
		At or Above Grade Level	Below Grade Level or GLA NA	Total
PAT - Grade 3 English Language Arts	Accept. or Excellence	77.6% (17,304)	**5.7%** (1,276)	83.4% (18,580)
	Below Accept., Excused or Absent	**8.1%** (1,801)	8.5% (1,905)	16.6% (3,706)
	Total	85.7% (19,105)	14.3% (3,181)	100.0% (22,286)
PAT - Grade 6 English Language Arts	Accept. or Excellence	77.9% (18,173)	**5.4%** (1,266)	83.3% (19,439)
	Below Accept., Excused or Absent	**8.1%** (1,887)	8.6% (2,014)	16.7% (3,901)
	Total	85.9% (20,060)	14.1% (3,280)	100.0% (23,340)
PAT – Grade 9 English Language Arts	Accept. or Excellence	76.2% (17,489)	**4.3%** (982)	80.5% (18,471)
	Below Accept., Excused or Absent	**10.8%** (2,483)	8.7% (1,999)	19.5% (4,482)
	Total	87.0% (19,972)	13.0% (2,981)	100.0% (22,953)

Note: All of the above observed relationships were significant when measured by Chi square. Bolded numbers represent inconsistent relationships between GLA and PAT data.

Table 39 - Comparison of Mathematics PAT and GLA

Comparison of Mathematics PAT and GLA				
		Grade Level of Achievement – Mathematics		
		At or Above Grade Level	Below Grade Level or GLA NA	Total
PAT - Grade 3 Mathematics	Accept. or Excellence	79.6% (17,753)	**3.5%** (788)	83.2% (18,541)
	Below Accept., Excused or Absent	**9.5%** (2,120)	7.3% (1,632)	16.8% (3,752)
	Total	89.1% (19,873)	10.9% (2,420)	100.0% (22,293)
PAT - Grade 6 Mathematics	Accept. or Excellence	74.0% (17,279)	**3.0%** (701)	77.0% (17,980)
	Below Accept., Excused or Absent	**13.4%** (3,134)	9.5% (2,226)	23.0% (5,360)
	Total	87.5% (20,413)	12.5% (2,927)	100.0% (23,340)
PAT – Grade 9 Mathematics	Accept. or Excellence	65.8% (15,056)	**3.0%** (679)	68.7% (15,735)
	Below Accept., Excused or Absent	**18.0%** (4,129)	13.2% (3,022)	31.2% (7,151)
	Total	83.8% (19,185)	16.2% (3,701)	100.0% (22,886)

Note: All of the above observed relationships were significant when measured by Chi square. Bolded numbers represent inconsistent relationships between GLA and PAT data.

It should be noted, in reviewing the above two tables, that more students are categorized as 'below grade level' in the PAT results than is true in GLA ratings. To illustrate, using the Mathematics table above, the following comparisons can be made:

Table 40 - Students below acceptable, excused or absent on the Mathematics PAT

Test	Total # of Students	# Students At or Above GLA Grade level	Percent of Students At or Above GLA Grade Level
PAT Math 3	3,752	2,120	56.5%
PAT Math 6	5,360	3,134	58.5%
PAT Math 9	7,151	4,129	57.7%

Table 41 - Students below grade level or GLA NA on GLA Mathematics

Test	Total # of Students	# Students Acceptable or Excellent on PAT	Percent of Students Acceptable or Excellent on PAT
PAT Math 3	2,420	788	32.6%
PAT Math 6	2,927	701	23.9%
PAT Math 9	3,701	679	18.3%

The following tables illustrate students below grade level on GLA and below acceptable on PAT in English Language Arts.

Table 42 - Students below acceptable, excused or absent on the English Language Arts PAT

Test	Total # of Students	# Students At or Above GLA Grade level	Percent of Students At or Above GLA Grade Level
PAT ELA 3	3,706	1,801	48.6%
PAT ELA 6	3,901	1,887	48.4%
PAT ELA 9	4,482	2,483	55.4%

Table 43 - Students below grade level or GLA NA on English Language Arts GLA

Test	Total # of Students	# Students Acceptable or Excellent on PAT	Percent of Students Acceptable or Excellent on PAT
PAT ELA 3	3,181	1,276	40.1%
PAT ELA 6	3,280	1,266	38.6%
PAT ELA 9	2,981	982	32.9%

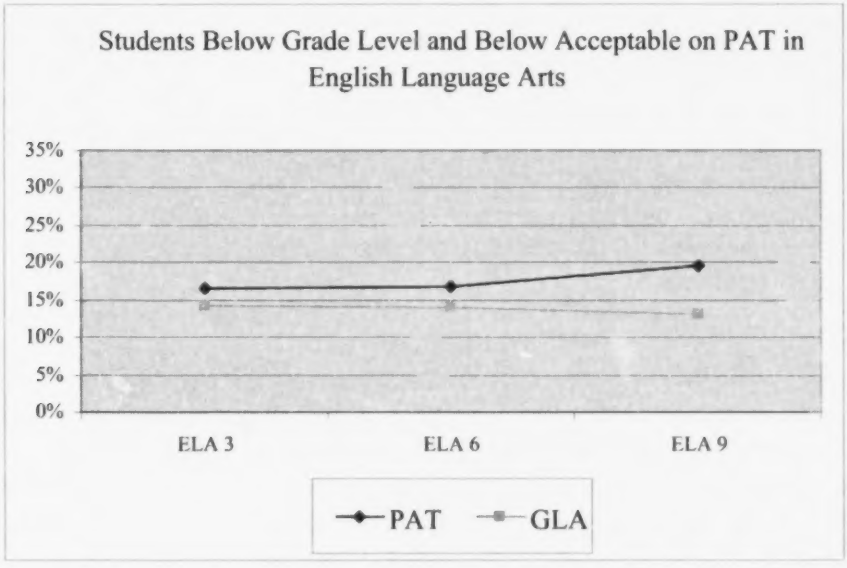
It would appear from the above tables that while nearly half of the students who do not attain the acceptable standard on the PAT are considered at or above grade level, a smaller percentage of those who are considered below grade level are able to attain the acceptable standard on the PAT. This suggests that in terms of evaluating acceptable progress, the PAT is a more difficult standard to attain than is the GLA. The two assessments can be expected to demonstrate some variance because they are different forms of assessment, but both are designed to assess whether a student has met grade level standards. Therefore, one might expect that the variability would be seen as much in one direction as the other. The fact that this is not true suggests several possibilities: 1) that it may be more difficult for teachers to assign a 'below grade level' evaluation to one of their students than is the case for markers of the PAT assessments, 2) student performance on PATs may be attenuated by test anxiety; 3) students may perform better on many assessments over time than on a single paper and pencil test, or 4) a combination of these factors.

Analysis of Students Below Grade Level

In this section the ratings given by teachers through the GLA are further compared to PAT results in Grades 3, 6 and 9. In each case, it is possible to identify the students who are rated as below grade level by their teachers (GLA) and those rated as below the acceptable standard by the PAT.

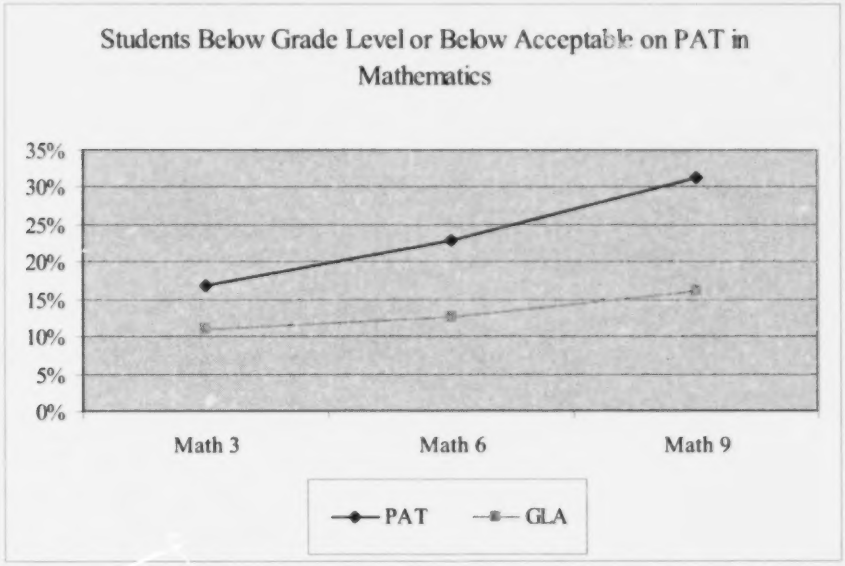
According to classical test theory (Crocker and Algina, 1986) all assessments are subject to some degree of test error. Given this fact the more achievement data available the clearer the true picture of a student's achievement becomes. One would expect some differences as well as complementary relationships in the designation of individuals in the two ratings provided by PAT and GLA data. Classroom assessment is based on an array of assessment methods over time for the GLA rating, ideally measuring the full and complete range of learning outcomes; whereas the PAT is a single, highly valid and reliable, selected and constructed response test that typically measures between 66% and 95% of the curricular outcomes in the tested subjects[9]. The PAT's are very likely the single best criterion-referenced assessment instrument available to the classroom teacher. Since the objective of both methods is to measure and provide evidence on how well a student is achieving as compared to the learning outcomes in the program of studies, one would expect a generally positive relationship between the students identified as "below" by both methods, and that is what we see in this data set. Where anomalous or inconsistent relationships are observed it presents the occasion to ask why and to delve deeper into the data to help understand why the measures differ.

An examination of the GLA pilot data for English Language Arts and Mathematics shows that this assumption departs most dramatically for Math 9.



[9] These figures were obtained from a discussion paper presented to the Program and Accountability Advisory Committee, November 8, 2007.

Note: The data presented in the above tables are discrete data points. The lines were included to emphasize the patterns of the data.



Note: The data presented in the above tables are discrete data points. The lines were included to emphasize the patterns of the data.

Discussion

A primary reason for provincial aggregation of Grade Level of Achievement data is evaluation of education programs such as special education, English as a Second Language, etc. This observation is particularly relevant for those grades that do not have PAT testing where GLA can provide data that would otherwise not be available. Additionally, it is useful to be able to supplement PAT data with GLA data in Grades 3, 6 and 9 as the added advantage would be broader and richer data to inform program evaluation related decisions. An example is the analysis of students below grade level or the analysis of students missing PAT data found on the next few pages.

Further, the fact that the tau-b values show moderate strength lends credibility to the process of collecting GLA. A perfect relationship of 1.0 between GLA and PAT is neither an expected nor a desirable condition given the inherent differences underlying the evaluation designs. PAT data are derived from a single paper and pencil test whereas GLA data are based on numerous and more dynamic observations over time, and thus should be a much richer method of assessment, which one could reasonably assume to produce, positively correlated albeit different data than a PAT result. Considered together, PAT and GLA data provide a richer and more comprehensive picture of student achievement.

GLA for Students Missing PAT Data

In order to determine whether GLA provides useful data for students for whom PAT data was unavailable, GLA data for these students was analyzed. Relative to the Grade 3, 6 and 9 students included in the 2006-07 GLA data set, the following table defines the breakdown of student categories and percent of students lacking PAT results and the corresponding GLA results.

Table 44 - Student Missing PAT Data Grade 3

		Student Code Groups						
		Non Coded	Severe	Mild/Moderate	Gifted	ESL – Cdn-born	ESL – Foreign-born	All Students
Grade 3 English Language Arts Students	Total Eligible to write PAT	17,405	605	1,398	151	1,642	1,320	22,376
	% of students writing PAT	96.1%	64.1%	72.5%	98.7%	92.9%	81.7%	93. 0%
Grade 3 students with no PAT data	**%not writing PAT**	3.9%	35.9%	27.5%	1.3%	7.1%	18.3%	7.0%
	Below Grade Level	194	130	314	0	52	76	731
	At Grade Level or Above	346	56	45	2	37	70	551
	No GLA	132	31	25	0	28	95	290
	% with no GLA	19.6%	14.3%	6.5%	0.0%	23.9%	39.4%	18.4%
	% of students with no PAT data having info using GLA	80.4%	85.7%	93.5%	100.0%	76.1%	60.6%	81.6%
% of Grade 3 students having info using GLA, PAT or both		99.2%	94.9%	98.2%	100.0%	98.3%	92.8%	98.7%

Grade 3 English Language Arts GLA data provided data for 82% of the population for whom no PAT data were previously available. Further, when GLA data are substituted, data are unavailable for only 5.1% of the sub-population coded severe (compared to 35.9% missing PAT data). Similarly, using GLA means data are unavailable for only 1.8% of the students in the dataset coded mild/moderate (compared to 27.5% using PAT data). Similar findings for Grades 6 and 9 in English Language Arts are summarized below.

Table 45 - Students Missing PAT Data Grade 6

		Student Code Groups						
		Non Coded	Severe	Mild/Moderate	Gifted	ESL – Cdn-born	ESL – Foreign-born	All Students
Grade 6 English Language Arts, Students	Total Eligible to write PAT	17,828	655	2,287	475	1,167	1,263	23,409
	% of students writing PAT	95.8%	54.5%	73.9%	99.2%	91.6%	86.1%	92.2%
Grade 6 students with no PAT data	**%not writing PAT**	4.2%	45.5%	26.1%	0.8%	8.4%	13.9%	7.8%
	Below Grade Level	177	193	508	0	66	76	958
	At Grade Level or Above	438	76	68	4	18	48	646
	No GLA	128	29	22	0	14	50	230
	% with no GLA	17.1%	9.7%	3.7%	0.0%	14.3%	28.7%	12.5%
	% of students with no PAT data having info using GLA	82.9%	90.3%	96.3%	100.0%	85.7%	71.3%	87.5%
% of Grade 6 students having info using GLA, PAT or both		99.3%	95.6%	99.0%	100.0%	98.8%	96.0%	99.0%

Table 46 - Students Missing PAT Data Grade 9

		Student Code Groups						
		Non Coded	Severe	Mild/Moderate	Gifted	ESL – Cdn-born	ESL – Foreign-born	All Students
Grade 9 English Language Arts Students	Total Eligible to write PAT	18,677	546	1,918	499	583	1,081	23,113
	% of students writing PAT	94.5%	46.5%	69.6%	96.6%	91.3%	83.1%	90.9%
Grade 9 students with no PAT data	**%not writing PAT**	5.5%	53.5%	30.4%	3.4%	8.7%	16.9%	9.1%
	Below Grade Level	225	135	315	1	27	86	755
	At Grade Level or Above	539	103	132	15	19	42	839
	No GLA	254	54	136	0	5	55	497
	% with no GLA	25.0%	18.5%	23.3%	0.0%	9.8%	30.1%	23.8%
	% of students with no PAT data having info using GLA	75.0%	81.5%	76.7%	100.0%	90.2%	69.9%	76.2%
% of Grade 9 students having info using GLA, PAT or both		98.6%	90.1%	93.0%	100.0%	99.1%	94.9%	97.8%

As the charts above demonstrate, GLA provides data for the majority of students who would otherwise not have any data provided.

Analysis of Grade ELA Introduced for FLA Students

In the 2006-07 GLA pilot, schools were asked to enter the grade English Language Arts was introduced to French students. The following table shows the distribution of the grade in which ELA was introduced.

Table 47 - Grade ELA Introduced Distribution

Grade ELA Intro	Frequency	Percent
1	1,471	17.0%
2	2,495	28.8%
3	4,535	52.3%
4	34	0.4%
5	11	0.1%
6	14	0.2%
7	86	1.0%
8	19	0.2%
9	8	0.1%
Total	8,673*	100.0%

*There were 4,013 students who did not have Grade ELA Introduced information

The majority of students had English Language Arts introduced in Grades 1 through 3. The following tables illustrate the French and English Language Arts GLA compared to the grade in which ELA was introduced. The tables only contain those students who had ELA introduced in Grades 1 through 3 as they are the largest group of students.

Table 48 - Grade ELA Introduced compared to French Language Arts GLA

Grade ELA Intro	GLA Equal or Above	GLA Below	GLA NA	Count
1	1,277 (86.8%)	194 (13.2%)	0 (0.0%)	1,471
2	2,445 (98.0%)	50 (2.0%)	0 (0.0%)	2,495
3	4,299 (94.8%)	235 (5.2%)	1 (0.0%)	4,535

Note: All of the above observed relationships were significant when measured by Chi square.

Table 49 - Grade ELA Introduced compared to English Language Arts GLA

Grade ELA Intro	GLA Equal or Above	GLA Below	GLA NA	Count
1	1,271 (86.4%)	200 (13.6%)	0 (0.0%)	1,471
2	2,434 (97.6%)	61 (2.4%)	0 (0.0%)	2,495
3	4,358 (96.1%)	176 (3.9%)	1 (0.0%)	4,535

Note: All of the above observed relationships were significant when measured by Chi square.

As the above tables illustrate, there are statistically significant relationships between the grade ELA introduced categories. When examining the GLA results for both FLA and ELA, students with an ELA introduced of Grade 2 seem to be the largest proportion of students attaining a GLA equal or above their enrolled grade.

Due to the variance of the grade in which ELA is introduced as shown in the above frequency table, it was decided that this field would continue to be reported in future GLA data submissions for French students.

Analysis of Students with Multiple Years of GLA Data

There were 64,170 students involved in both the 2005-06 and 2006-07 GLA data collections. There were 82,390 student records submitted in 2005-06 and 220,682 in 2006-07 with 78% of the 2005-06 student cohort having data for both years. The following analysis is based only on those students for whom GLA data is available for both years and is presented only to illustrate the type of trend analysis that will become viable as the GLA initiative becomes implemented over several years.

Students enrolled grade in 2005-06 and 2006-07 are shown below.

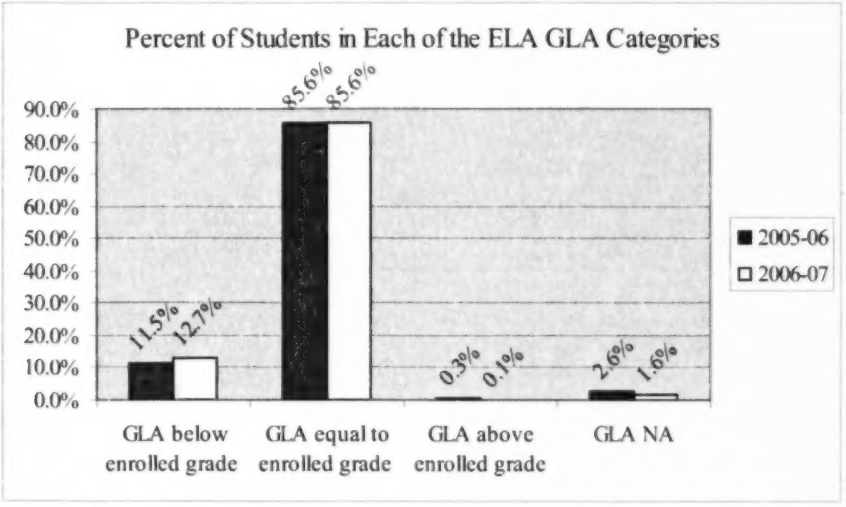
Enrolled Grade				
	2005-06		2006-07	
Enrolled Grade	Frequency	Percent	Frequency	Percent
1	7,929	12.4%	104	.2%
2	8,234	12.8%	7,892	12.3%
3	8,210	12.8%	8,200	12.8%
4	8,225	12.8%	8,212	12.8%
5	8,424	13.1%	8,227	12.8%
6	7,535	11.7%	8,404	13.1%
7	7,684	12.0%	7,558	11.8%
8	7,898	12.3%	7,665	11.9%
9	31	.0%	7,908	12.3%
Total	64,170	100.0%	64,170	100.0%

The following table shows the English Language Arts GLA codes for all students submitting in both years.

Table 50 – All Students, English Language Arts

All Students - English Language Arts				
	2005-06		2006-07	
	Number of students	Percent of total enrolled (%)	Number of students	Percent of total enrolled (%)
GLA below enrolled grade	7,348*	11.5%	8,146*	12.7%
GLA equal to enrolled grade	54,938	85.6%	54,903	85.6%
GLA above enrolled grade	222*	0.3%	94*	0.1%
GLA NA	1,662*	2.6%	1,027*	1.6%
Total	**64,170**	**100.0%**	**64,170**	**100.0%**

*Indicates a significant difference between 2005-06 and 2006-07

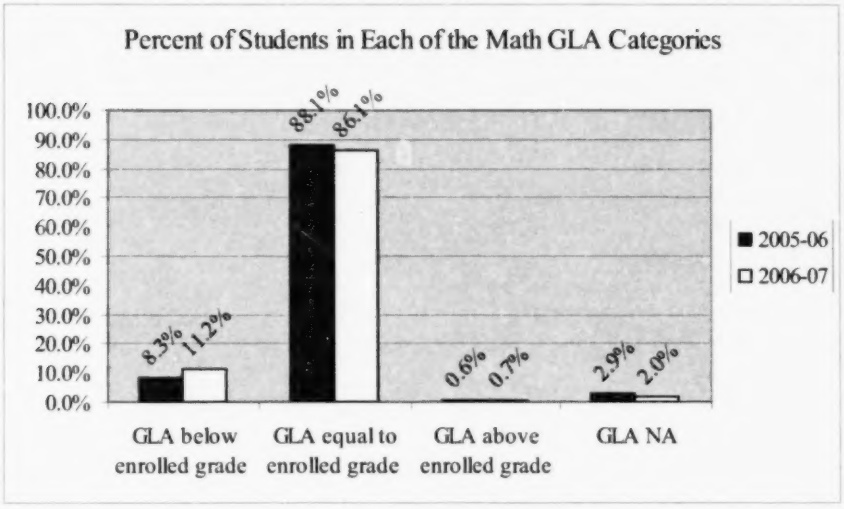


There is a drop in the number of students attaining the above grade level category and there is an increase in the number of students attaining below grade level. In Mathematics the same patterns emerge.

Table 51 – All Students, Mathematics

All Students - Mathematics				
	2005-06		2006-07	
	Number of students	Percent of total enrolled (%)	Number of students	Percent of total enrolled (%)
GLA below enrolled grade	5,348*	8.3%	7,181*	11.2%
GLA equal to enrolled grade	56,562*	88.1%	55,219*	86.1%
GLA above enrolled grade	396	0.6%	466	0.7%
GLA NA	1,864*	2.9%	1,304*	2.0%
Total	**64,170**	**100.0%**	**64,170**	**100.0%**

*Indicates a significant difference between 2005-06 and 2006-07



Comparison of English Language Arts, 2005-06 to 2006-07

To better understand the student's changes in grade level of achievement from 2005-06 to 2006-07, the following tables were produced.

Table 52 – 2006-07 Results for Students At or Above Grade Level in 2005-06, English Language Arts

Students At or Above Grade Level in 2005-06 - English Language Arts		
	2006-07	
	Number of students	Percent of total enrolled (%)
GLA below enrolled grade	3,234	5.9%
GLA equal to or above enrolled grade	51,496	93.4%
GLA NA	430	0.8%
Total	**55,160**	**100.0%**

Table 53 – 2006-07 Results for Students Below Grade Level in 2005-06, English Language Arts

Students Below Grade Level in 2005-06 - English Language Arts		
	2006-07	
	Number of students	Percent of total enrolled (%)
GLA below enrolled grade	4,674	63.6%
GLA equal to or above enrolled grade	2,366	32.2%
GLA NA	308	4.2%
Total	**7,348**	**100.0%**

Comparison of Mathematics, 2005-06 to 2006-07

Table 54 – 2006-07 Results for Students At or Above Grade Level in 2005-06, Mathematics

Students At or Above Grade Level in 2005-06 - Mathematics		
	2006-07	
	Number of students	Percent of total enrolled (%)
GLA below enrolled grade	3,580	6.3%
GLA equal to or above enrolled grade	52,844	92.8%
GLA NA	534	0.9%
Total	**56,958**	**100.0%**

Table 55 – 2006-07 Results for Students Below Grade Level in 2005-06, Mathematics

Students Below Grade Level in 2005-06 - Mathematics		
	2006-07	
	Number of students	Percent of total enrolled (%)
GLA below enrolled grade	3,373	63.1%
GLA equal to or above enrolled grade	1,700	31.8%
GLA NA	275	5.1%
Total	**5,348**	**100.0%**

From the above tables it is apparent that in Mathematics, most students who were at or above grade level in 2005-06 attained the same categorization in the following year (92.8%). For students categorized as below grade level in 2005-06, 31.8% achieved a GLA equal to or above their enrolled grade in the following year. A similar pattern is shown for English Language Arts.

Change in GLA by Enrolled Grade

The following tables show students' GLA in English Language Arts and Mathematics for 2005-06 and 2006-07. In order to be part of this analysis, students had to have advanced an enrolled grade from 05-06 to 06-07. Five hundred (500) students were excluded from this analysis.

Grade One to Grade Two

	Grade 1 - 05-06		Grade 2 – 06-07	
Grade Level	ELA	% of Total	ELA	% of Total
N1	771	9.9	155	2.0
1	**6,345**	**81.1**	847	10.8
2	24	0.3	**6,553**	**83.8**
3	6	0.1	17	0.2
4	0	0.0	6	0.1
Missing	677	8.9	245	3.1
Total	**7,823**	**100.0**	**7,823**	**100.0**

	Grade 1 - 05-06		Grade 2 – 06-07	
Grade Level	Math	% of Total	Math	% of Total
N1	388	5.0	87	1.1
1	**7,227**	**92.4**	611	7.8
2	21	0.3	**7,042**	**90.0**
3	9	0.1	14	0.2
4	4	0.1	4	0.1
Missing	174	2.1	65	0.9
Total	**7,823**	**100.0**	**7,823**	**100.0**

Grade Two to Grade Three

	Grade 2 – 05-06		Grade 3 – 06-07	
Grade Level	**ELA**	**% of Total**	**ELA**	**% of Total**
N1	176	2.2	36	0.4
1	751	9.2	219	2.7
2	**6,891**	**84.5**	836	10.2
3	35	0.4	**6,913**	**84.7**
4	5	0.1	24	0.3
5	2	0.0	1	0.0
Missing	299	3.6	130	1.7
Total	**8,159**	**100.0**	**8,159**	**100.0**

	Grade 2 – 05-06		Grade 3 – 06-07	
Grade Level	**Math**	**% of Total**	**Math**	**% of Total**
N1	93	1.1	26	0.3
1	389	4.8	117	1.4
2	**7,466**	**91.5**	684	8.4
3	43	0.5	**7,198**	**88.2**
4	1	0.0	35	0.4
5	0.	0.0	0	0.0
Missing	167	2.1	99	1.2
Total	**8,159**	**100.0**	**8,159**	**100.0**

Grade Three to Grade Four

	Grade 3 – 05-06		Grade 4 – 06-07	
Grade Level	**ELA**	**% of Total**	**ELA**	**% of Total**
N1	68	0.8	15	0.2
1	210	2.6	90	1.1
2	689	8.4	221	2.7
3	**7,033**	**86.2**	803	9.8
4	24	0.3	**6,963**	**85.3**
5	0	0.0	15	0.2
6	0	0.0	0	0.0
Missing	139	1.7	56	0.7
Total	**8,163**	**100.0**	**8,163**	**100.0**

	Grade 3 – 05-06		Grade 4 – 06-07	
Grade Level	**Math**	**% of Total**	**Math**	**% of Total**
N1	42	0.5	5	0.1
1	148	1.8	42	0.5
2	454	5.6	203	2.5
3	**7,327**	**89.8**	633	7.8
4	55	0.7	**7,203**	**88.2**
5	1	0.0	23	0.3
6	0	0.0	1	0.0
Missing	136	1.6	53	0.6
Total	**8,163**	**100.0**	**8,163**	**100.0**

Grade Four to Grade Five

	Grade 4 – 05-06		Grade 5 – 06-07	
Grade Level	**ELA**	**% of Total**	**ELA**	**% of Total**
N1	38	0.5	11	0.1
1	108	1.3	45	0.6
2	244	3.0	110	1.3
3	614	7.5	274	3.4
4	**6,998**	**85.6**	742	9.1
5	18	0.2	**6,927**	**84.8**
6	5	0.1	6	0.1
7	1	0.0	1	0.0
8	0	0.0		
Missing	147	1.8	57	0.6
Total	**8,173**	**100.0**	**8,173**	**100.0**

	Grade 4 – 05-06		Grade 5 – 06-07	
Grade Level	**Math**	**% of Total**	**Math**	**% of Total**
N1	25	0.3	4	0.0
1	60	0.7	42	0.5
2	213	2.6	95	1.2
3	416	5.1	244	3.0
4	**7,273**	**89.0**	589	7.2
5	28	0.3	**7,118**	**87.1**
6	1	0.0	28	0.3
7	0	0.0	1	0.0
8	1	0.0		
Missing	156	2.0	52	0.6
Total	**8,173**	**100.0**	**8,173**	**100.0**

Grade Five to Grade Six

	Grade 5 – 05-06		Grade 6 – 06-07	
Grade Level	ELA	% of Total	ELA	% of Total
N1	25	0.3	8	0.1
1	45	0.5	20	0.2
2	140	1.7	62	0.7
3	292	3.5	141	1.7
4	561	6.7	281	3.4
5	**7,179**	**85.9**	675	8.1
6	14	0.2	**7,110**	**85.0**
7	6	0.1	6	0.1
8	0	0.0	3	0.0
9	0	0.0		
Missing	99	1.1	55	0.7
Total	**8,361**	**100.0**	**8,361**	**100.0**

	Grade 5 – 05-06		Grade 6 – 06-07	
Grade Level	Math	% of Total	Math	% of Total
N1	17	0.2	5	0.1
1	26	0.3	12	0.1
2	109	1.3	46	0.6
3	208	2.5	122	1.5
4	474	5.7	249	3.0
5	**7,369**	**88.1**	615	7.4
6	27	0.3	**7,244**	**86.6**
7	1	0.0	21	0.3
8	1	0.0	1	0.0
9	0	0.0	1	0.0
Missing	129	1.6	45	0.5
Total	**8,361**	**100.0**	**8,361**	**100.0**

Grade Six to Grade Seven

	Grade 6 – 05-06		Grade 7 – 06-07	
Grade Level	ELA	% of Total	ELA	% of Total
N1	16	0.2	3	0.0
1	14	0.2	4	0.1
2	61	0.8	18	0.2
3	170	2.3	51	0.7
4	247	3.3	83	1.1
5	444	5.9	149	2.0
6	**6,408**	**85.5**	404	5.4
7	11	0.1	**6,618**	**88.3**
8	1	0.0	6	0.1
9	0	0.0	0	0.0
Missing	124	1.7	160	2.1
Total	**7,496**	**100.0**	**7,496**	**100.0**

	Grade 6 – 05-06		Grade 7 – 06-07	
Grade Level	Math	% of Total	Math	% of Total
N1	15	0.2	6	0.1
1	11	0.1	2	0.0
2	41	0.5	8	0.1
3	140	1.9	42	0.6
4	198	2.6	88	1.2
5	315	4.2	121	1.6
6	**6,601**	**88.1**	426	5.7
7	11	0.1	**6,372**	**85.0**
8	5	0.1	102	1.4
9	0	0.0	31	0.4
Missing	159	2.2	298	4.0
Total	**7,496**	**100.0**	**7,496**	**100.0**

Grade Seven to Grade Eight

	Grade 7 – 05-06		Grade 8 – 06-07	
Grade Level	ELA	% of Total	ELA	% of Total
N1	12	0.2	2	0.0
1	2	0.0	2	0.0
2	28	0.4	16	0.2
3	54	0.7	26	0.3
4	128	1.7	61	0.8
5	181	2.4	86	1.1
6	270	3.5	151	2.0
7	**6,817**	**89.4**	543	7.1
8	17	0.2	**6,592**	**86.4**
9	4	0.1	4	0.1
10	0	0.0	0	0.0
11	0	0.0	0	0.0
Missing	116	1.4	146	2.0
Total	**7,629**	**100.0**	**7,629**	**100.0**

	Grade 7 – 05-06		Grade 8 – 06-07	
Grade Level	Math	% of Total	Math	% of Total
N1	10	0.1	3	0.0
1	1	0.0	1	0.0
2	16	0.2	8	0.1
3	39	0.5	22	0.3
4	88	1.2	50	0.7
5	147	1.9	66	0.9
6	336	4.4	150	2.0
7	**6,468**	**84.8**	668	8.8
8	96	1.3	**6,228**	**81.6**
9	0	0.0	126	1.7
10	0	0.0	4	0.1
11	0	0.0	2	0.0
Missing	428	5.6	301	3.9
Total	**7,629**	**100.0**	**7,629**	**100.0**

Grade Eight to Grade Nine

	Grade 8 – 05-06		Grade 9 – 06-07	
Grade Level	ELA	% of Total	ELA	% of Total
N1	7	0.1	5	0.1
1	4	0.1	6	0.1
2	10	0.1	5	0.1
3	38	0.5	20	0.3
4	58	0.7	28	0.4
5	93	1.2	41	0.5
6	145	1.8	81	1.0
7	272	3.5	123	1.6
8	**7,151**	**90.9**	561	7.1
9	38	0.5	**6,830**	**86.8**
10	1	0.0	2	0.0
Missing	49	0.6	164	2.0
Total	**7,866**	**100.0**	**7,866**	**100.0**

	Grade 8 – 05-06		Grade 9 – 06-07	
Grade Level	Math	% of Total	Math	% of Total
N1	6	0.1	4	0.1
1	1	0.0	1	0.0
2	3	0.0	5	0.1
3	23	0.3	12	0.2
4	51	0.6	33	0.4
5	88	1.1	30	0.4
6	123	1.6	70	0.9
7	300	3.8	118	1.5
8	**6,686**	**85.0**	758	9.6
9	81	1.0	**6,395**	**81.3**
10	0	0.0	68	0.9
Missing	504	6.5	372	4.7
Total	**7,866**	**100.0**	**7,866**	**100.0**

The tables above illustrate interesting patterns of grade level achievement. For students who are evaluated as being below grade level, there are many that have a grade level of achievement that is more than one grade below their enrolled grade. It is interesting to note that in Mathematics, every group of students in the 2005-06 cohort, the percent of students at grade level decreases from 2005-06 to 2006-07.

Conclusions

This report described the processes and outcomes associated with the 2006-07 Grade Level of Achievement (GLA) pilot data collection, data management and data analysis. The key questions addressed by this report were 1) can GLA data be collected and reported on a consistent basis, and 2) does the data contribute to our knowledge base regarding student achievement? Results of this and previous studies of GLA pilots demonstrate that the answer to these two questions is yes and is demonstrated by the following key findings:

- The degree of jurisdiction participation in the 2006-07 pilot was much higher than expected. A participation rate of 33 % was expected; however, the data submitted represents 60% of schools.
- The error rate for data submission was low with only 2.2% of the files submitted having errors.
- Compared to the 2005-06 data, the 2006-07 data demonstrates similar results for the total cohort and for specific sub-groupings of GLA data. Patterns of data distribution observed in 2005-06 with 82,000 students were also observed in the 2006-07 data.
- The data analysis demonstrates many interesting relationships. For example:
    - The large difference between Math 9 Provincial Achievement Test data and GLA continues to be evident.
    - Significant variations are observed in GLA between student sub-groups. The GLA at a Glance (Table 36) illustrates this.
    - A much higher percentage of students coded as gifted are assessed above grade level in Math than in English Language Arts or French Language Arts.

- When comparing foreign-born and Canadian-born students, both groups of students perform similarly in Mathematics but in English Language Arts, Canadian-born students are at an advantage.
- Although a serendipitous finding, there is a disproportionate ratio of male: female severely coded students. There are nearly four times as many males as females coded as severely disabled.
- When comparing GLA and PAT data, females outperform males in GLA to a statistically significant degree in both subjects in nearly all enrolled grades. The reverse is seen on the Math PAT results with males outperforming females to a statistically significant degree. In English Language Arts, females are outperforming males on the PATs.
- A greater proportion of high mobility students (i.e. those who have changed schools more frequently than other students) have a GLA below their enrolled grade level.

- When examining mean GLA compared to enrolled grade, interesting patterns emerge:
  - The relationship between enrolled grade and GLA for non-coded students is very close as expected and is generally aligned with PAT results.
  - The variance between enrolled grade and GLA tends to increase through the elementary grades and peaks at grade 6 and grade 9 for students with a severe disability.
  - A similar pattern is seen for students with a mild/moderate disability, but the peak in grade nine is absent.
  - Gifted students are more likely to have a GLA above enrolled grade in Mathematics than in Language Arts.
  - Foreign-born and Canadian-born ESL students' GLA distributions are much closer together this year than was seen in the 2005-06 data.
  - Foreign-born ESL students seem to have a GLA on par with their enrolled grade in Mathematics up until Grade 5. In English Language Arts the two measures diverge as early as Grade 2.
- The age effect[10] is apparent in English Language Arts in Grades 1 through 5. After Grade 5, the age effect tapers off and is no longer apparent. This relationship is more pronounced in the 2006-07 GLA data than in 2005-06, possibly due to the larger number of students in the 2006-07 data.
- There are moderate strength correlations between PATs and GLA (Grades 3, 6 and 9). This demonstrates a reasonable degree of concurrent validity of the GLA data.
- Using GLA and PAT information, GLA can provide important information for students that would not otherwise be available for students in grades not tested by PATs.

Future Analysis

As noted in the Limitations section of this report, given the pilot nature of the data presented, the findings must be considered preliminary and can provide only tentative conclusions regarding levels of student achievement and factors that affect achievement for specific student cohorts.

[10] Age effect is defined as older students in a grade tending to have higher average test scores than the younger students in that same grade when measured by the z-score of average PAT results for each birth month group (Alberta Learning, 2001).

Nevertheless, this report points to a number of potential research questions that may require further analysis as GLA reporting becomes more confirmatory as full implementation is attained in the 2007-08 school year. Among the questions that may require investigation are:

- Does the grade 9 PAT in mathematics or the GLA for mathematics 9 represent the best predictive validity for subsequent high school math achievement?
- What are the reasons for classroom-based assessment providing higher marks for female vs. male students in mathematics contradictory to PAT marks?
- Why are gifted students more likely to have a GLA above their enrolled grade in mathematics than in Language Arts?
- Why is the proportion of male students coded with a severe disability so much higher than female students?
- What strategies might be most effective in offsetting the negative effect of mobility on student achievement?
- What pedagogical adaptations might be helpful in mitigating the age effect in the early grades?

In addition, in future years the 2006 census data will be available for analysis. At that time, the census data will be compared to the 2007-08 GLA data to provide an indication of the extent to which variables external to the school influences student achievement. To create the most accurate comparison of the census data and the GLA data, the census data will be broken down by enrolled students' postal code.

The organization of census data from 2001 is largely the same as that from 2006 with the main difference being Mother's level of education. In 2001, the variable was Mother's years of education. In 2006, the variable is now Mother's level of education.

Once data is available, the following analysis will be done:

- Jurisdiction by Mother's level of education
- Jurisdiction by Avg. family income/LICO
- Jurisdiction by rent/own

The SES variables will then be compared to GLA to see if any patterns emerge. The following tables will show these results:

- GLA by Mother's level of education
- GLA by avg. family income/LICO
- GLA by rent/own

Bibliography

Alberta Learning (2001). *Entry Age, Age Within Cohort, and Achievement.* Edmonton, AB.

Alberta Learning (2004). *Standards for Special Education.* Edmonton, AB. Available at http://www.education.gov.ab.ca/k_12/specialneeds/SpecialEd_Stds2004.pdf

Alberta Education (2007). Grade *Level of Achievement 2005-06 Pilot Data – Technical Report.* Edmonton, AB. Available at http://www.education.gov.ab.ca/ipr/GLA/GLATechnicalReport.pdf

Alberta Education (2006). *Grade Level of Achievement Reporting: Teacher and Administrator Handbook.* Edmonton, AB. Available at http://www.education.gov.ab.ca/ipr/GLA/TeachAdminHandbook.pdf

Alberta Education (2005). *Beyond MIRS Data – Technical Report.* Edmonton, AB.

Crocker, L., Algina, J. (1986). *Introduction to Classical and Modern Test Theory.* Holt, Rinehart and Winston, New York.

Harris, M. B. (1995). *Basic Statistics for Behavioural Science Research. 2nd Edition.* Allyn and Bacon. Needham Heights, Massachusetts.

Neuman, W. L. (2000). *Social Research Methods: qualitative and quantitative approaches.* 4th Edition. Allyn and Bacon. Needham Heights, Massachusetts.

Pashler, H., Bain, P., Bottge, B., Graesser, A., Koedinger, K., McDaniel, M., and Metcalfe, J. (2007). *Organizing Instruction and Study to Improve Student Learning* (NCER 2007-2004). Washington, DC: National Center for Education Research, Institute of Education Sciences, U.S. Department of Education. Retrieved from http://ncer.ed.gov.

Pope, G.A., Wentzel, C., & Cammaert, R. (2003). Relationships between gender and Alberta diploma scores. Alberta Journal of Educational Research, 48(4), 275-286

Wasserman, D. (2001). *Moving Targets: Student Mobility and School and Student Achievement.* Alberta Learning, Edmonton, Alberta.